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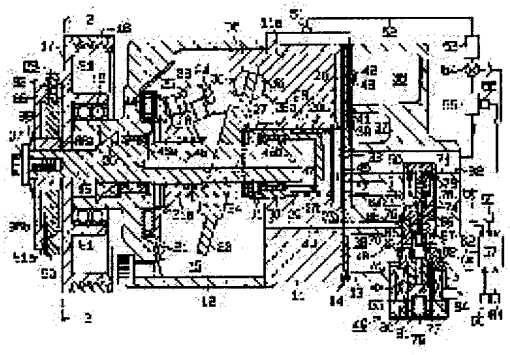
(71)Applicant : TOYOTA AUTOM LOOM WORKS LTD
(72)Inventor : KAWAGUCHI MASAHIRO
OKADA MASAHIKO
KAWAMURA KOJI
MURASE MASAKAZU
FUKANUMA TETSUHIKO
KUBO YUJI

(54) POWER TRANSMISSION MECHANISM OF CLUTHLESS VARIABLE CAPACITY COMPRESSOR

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a power transmission mechanism of a clutchless variable capacity compressor, which is simple in structure, the function of which is little deteriorated even under the environment of low temperature, and by which fluctuation of load torque on the compressor side can be effectively lightened.
SOLUTION: An interposing member 89 comprising a connecting part 91 formed of a metallic material and an elastic deforming part 90 formed of a thermoplastic resin material is disposed between a driving shaft 16 and a pulley 17. The interposing member 89 is connected to one of the driving shaft 16 and the pulley 17, and it is always pressed to the other to be integrally rotated. When the load torque on the driving shaft 16 side fluctuates, the elastic deforming part 90 is elastically deformed. If the load torque becomes excessive, the elastic deforming part 91 is fused by frictional heat produced by the relative sliding of the press-contacting parts.



* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1]In a clutch loess variable displacement compressor which carried out operation connection, an external driving source and a driving shaft via a belt and a belt pulley always between said driving shaft and a belt pulley, While allocating an interposing member provided with an elastic deformation part which consists of a connecting part which consists of metallic materials, and thermoplastics material and combining the interposing member with either of a driving shaft and a belt pulley, When it is made to really weld by pressure to a usual state pivotable to another side and load torque by the side of a driving shaft is changed, A power transmission device of a clutch loess variable displacement compressor it was made for an elastic deformation part of an interposing member to fuse with frictional heat accompanying relative sliding of a pressure welding part when an elastic deformation part of an interposing member carried out elastic deformation and load torque by the side of a driving shaft became excessive.
[Claim 2]A power transmission device of the clutch loess variable displacement compressor according to claim 1 which attached a transmitting power object firmly to said driving shaft, allocated an interposing member between facing end faces of the transmitting power object and belt pulley, and made a connecting part of the interposing member weld by pressure to a belt pulley which consists of a transmitting power object or a metallic material which consists of metallic materials.
[Claim 3]A power transmission device of the clutch loess variable displacement compressor according to claim 1 which attached a transmitting power object firmly to said driving shaft, allocated an interposing member between facing end faces of the transmitting power object and belt pulley, and made an elastic deformation part of the interposing member weld by pressure to a belt pulley which consists of a transmitting power object or a metallic material which consists of metallic materials.
[Claim 4]A power transmission device of the clutch loess variable displacement compressor according to claim 1 which carried out joint firm attachment and both [object / driving shaft / transmitting power] used an elastic deformation part of said interposing member.
[Claim 5]A power transmission device of the clutch loess variable displacement compressor according to any one of claims 1 to 4 which formed a connecting part of said interposing member with iron system metal material.
[Claim 6]A power transmission device of the clutch loess variable displacement compressor according to any one of claims 1 to 5 which consists of thermoplastics material in which an elastic deformation part of said interposing member contains a filler.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the power transmission device in the clutch loess variable displacement compressor which was always made to carry out operation connection of an external driving source and the driving shaft via the belt and the belt pulley.
[0002]
[Description of the Prior Art]Generally, the clutch loess variable displacement compressor is not provided with the electromagnetic clutch for performing connection and interception of transmitting power between the external driving source and the driving shaft of a compressor. For this reason, in especially a vehicles mount condition, the badness of the somesthesis feeling accompanying the shock of intermittence of an electromagnetic clutch is cancelable. Since said electromagnetic clutch has power consumption and large weight, saving-power-izing of a compressor, reduction of the whole weight, and reduction of cost can be aimed at.
[0003]However, in such a clutch loess variable displacement compressor, the vehicle engine which makes an external driving source is affected directly, without easing change of the load torque by the side of a compressor. For this reason, there was a possibility of changing the operational status of vehicle engine, by change of the load torque by the side of a compressor.
[0004]In order to cope with such a problem, a clutch loess variable displacement compressor which is indicated by JP,63-142460,U (the 1st gazette) and JP,8-121332,A (the 2nd gazette), for example is proposed from the former.
[0005]In the compressor indicated by the 1st gazette, while an engaging recess is provided in the annular **-like wall formed in the belt pulley, the engaging recess is provided in the peripheral surface of the hub. One end of a drive lever is inserted in the engaging recess by the side of a **-like wall, and the other end of the drive lever is inserted in the engaging recess by the side of a hub via the annular flat spring. And rotation of a belt pulley is usually transmitted to a driving shaft via a drive lever and a flat spring.
[0006]When the load torque by the side of a compressor is changed, change of the load torque is eased by rocking of a drive lever, and the elastic deformation of a flat spring, and the engine speed fluctuation of the vehicle engine resulting from change of load torque is controlled. When the load torque by the side of a compressor becomes excessive, the other end of a drive lever separates from the crevice of a flat spring, and excessive load torque affects the vehicle engine side.
[0007]On the other hand, in the compressor indicated by the 2nd gazette, a transmitting power object is attached firmly to the end of a driving shaft, and the annular rubber damper is infixed between the peripheral face of this transmitting power object, and the inner skin of a belt pulley.

The inner skin of this India rubber is combined with a transmitting power object by adhesives, and the peripheral face of the rubber damper is combined with the belt pulley by adhesives.
[0008]And rotation of a belt pulley is usually transmitted to a driving shaft via a rubber damper and a transmitting power object. Here, when the load torque by the side of a compressor is changed, change of the load torque is eased by the elastic deformation of a rubber damper, and the engine speed fluctuation of the vehicle engine resulting from change of load torque is controlled. When the load torque by the side of a compressor becomes excessive, the rubber damper itself fractures and excessive load torque affects the vehicle engine side.
[0009]
[Problem(s) to be Solved by the Invention]However, in the conventional compressor indicated by the 1st gazette, two or more drive levers are supported rockable, and the oscillation displacement of a drive lever is responded to with a flat spring. For this reason, the structure of the power transmission device was complicated, part mark and an attachment man day increased, and there was a problem that the cost of a compressor became high.
[0010]In the conventional compressor indicated by the 2nd gazette, the annular rubber damper is infixed between the transmitting power object and the belt pulley. Here, when a compressor is used in a cold district etc. by low temperature environment lower than the glass transition temperature of the rubber material of a rubber damper, there is a possibility that a rubber material may carry out low temperature embrittlement. In the state of this low temperature embrittlement, a rubber material becomes hard, and while that elasticity falls greatly, it becomes weak. For this reason, there was a problem that there was a possibility that it becomes impossible to ease change of load torque effectively, and it may fracture carelessly even if a rubber damper is not big load torque.
[0011]This invention is made paying attention to the problem which exists in such a Prior art. Although the place made into the purpose is simple for structure, while there is almost no depression under low temperature environment and being able to ease effectively change of the load torque by the side of a compressor, It is in providing the power transmission device of the clutch loess variable displacement compressor which can intercept transfer of overload torque certainly.
[0012]
[Means for Solving the Problem]In order to attain the above-mentioned purpose, in the invention according to claim 1. In a power transmission device of a clutch loess variable displacement compressor which was always made to carry out operation connection of an external driving source and the driving shaft via a belt and a belt pulley, While allocating an interposing member provided with an elastic deformation part which consists of a connecting part which consists of metallic materials, and thermoplastics material between said driving shaft and a belt pulley and combining the interposing member with either of a driving shaft and a belt pulley, When it is made to really weld by pressure to a usual state pivotable to another side and load torque by the side of a driving shaft is changed, When an elastic deformation part of an interposing member carries out elastic deformation and load torque by the side of a driving shaft becomes excessive, it is made for an elastic deformation part of an interposing member to fuse with frictional heat accompanying relative sliding of a pressure welding part.
[0013]In a power transmission device of the clutch loess variable displacement compressor according to claim 1 by the invention according to claim 2, A transmitting power object is attached firmly to said driving shaft, an interposing member is allocated between facing end faces of the transmitting power object and belt pulley, and a connecting part of the interposing member is made to weld by pressure to a belt pulley which consists of a transmitting power object or a metallic material which consists of metallic materials.

[0014]In a power transmission device of the clutch loess variable displacement compressor according to claim 1 by the invention according to claim 3, A transmitting power object is attached firmly to said driving shaft, an interposing member is allocated between facing end faces of the transmitting power object and belt pulley, and an elastic deformation part of the interposing member is made to weld by pressure to a belt pulley which consists of a transmitting power object or a metallic material which consists of metallic materials.
[0015]In the invention according to claim 4, in a power transmission device of the clutch loess variable displacement compressor according to claim 1, joint firm attachment is carried out and an elastic deformation part of said interposing member is both [object / driving shaft / transmitting power] used.
[0016]In the invention according to claim 5, a connecting part of said interposing member is formed with iron system metal material in a power transmission device of the clutch loess variable displacement compressor according to any one of claims 1 to 4.
[0017]In a power transmission device of the clutch loess variable displacement compressor according to any one of claims 1 to 5, thermoplastics material containing a filler constitutes an elastic deformation part of said interposing member from the invention according to claim 6.
[0018]Now, in a power transmission device of the clutch loess variable displacement compressor according to claim 1, a belt pulley is always rotating via a belt according to an external driving source of vehicle engine etc. And rotation of a belt pulley is usually transmitted to a driving shaft via an interposing member, and compression operation of the compressor is carried out. If load torque by the side of a compressor is changed at the time of operation of this compressor, an elastic deformation part of an interposing member will carry out elastic deformation, and change of that load torque will be eased. For this reason, it is controlled that change of load torque by the side of a compressor affects the external driving source side.
[0019]When load torque by the side of a compressor becomes excessive, relative sliding arises in a pressure welding part between an interposing member, a driving shaft, or a belt pulley, and frictional heat occurs. And an elastic deformation part of an interposing member fuses with this frictional heat. Thereby, a transmitting power function of an interposing member is destroyed and transfer of overload torque from a driving shaft to a belt pulley is intercepted. For this reason, it is controlled that overload torque is transmitted to the external driving source side, and has an adverse effect.
[0020]Since an elastic deformation part of an interposing member is formed with thermoplastics material, compared with a case where a rubber material is used, a fluctuation range of elasticity by temperature of an operating environment of an elastic deformation part can make it small. For this reason, even when a compressor is used by low temperature environment of a cold district etc., it can control it becoming impossible for an elastic deformation part to ease change of load torque effectively, and being carelessly fractured by small load torque.
[0021]In a power transmission device of the clutch loess variable displacement compressor according to claim 2, a connecting part of an interposing member which consists of metallic materials is welded by pressure to a transmitting power object or a belt pulley on a driving shaft which similarly consists of metallic materials. For this reason, when load torque by the side of a compressor becomes excessive, relative sliding arises in a pressure welding part between a connecting part of an interposing member, a transmitting power object, or a belt pulley, and frictional heat occurs. And this frictional heat is transmitted to an elastic deformation part of an interposing member from a connecting part, melting of that elastic deformation part is carried out, and relative rotating of the connecting part comes to be carried out to an elastic deformation part after that. Thereby, transfer of overload torque from a driving shaft to a belt pulley is intercepted certainly.

[0022]In a power transmission device of the clutch loess variable displacement compressor according to claim 3, an elastic deformation part of an interposing member which consists of thermoplastics material is welded by pressure to a transmitting power object or a belt pulley on a driving shaft which consists of metallic materials. For this reason, when load torque by the side of a compressor becomes excessive, relative sliding arises in a pressure welding part between an elastic deformation part of an interposing member, a transmitting power object, or a belt pulley, and frictional heat occurs. Melting of near the pressure welding part of an elastic deformation part is carried out by this frictional heat, and transfer of overload torque from a driving shaft to a belt pulley is intercepted. And after overload torque by the side of a compressor settles down and generation of heat of a pressure welding part is subsided, near the pressure welding part of an elastic deformation part of an interposing member is re-solidified from a molten state, and transmitting power can be resumed.
[0023]In a power transmission device of the clutch loess variable displacement compressor according to claim 4, joint firm attachment is carried out and an elastic deformation part of an interposing member both [object / driving shaft / transmitting power] uses. For this reason, while not installing a transmitting power object separately to a driving shaft and being able to reduce part mark, a weight saving of a compressor can be attained.
[0024]In a power transmission device of the clutch loess variable displacement compressor according to claim 5, a connecting part of an interposing member is formed with a thermally conductive and rigid high iron system metal material. For this reason, in composition welded by pressure to a transmitting power object or a belt pulley on a driving shaft in which especially a connecting part of an interposing member consists of metallic materials, frictional heat accompanying relative sliding of a pressure welding part is promptly transmitted to an elastic deformation part of an interposing member from a connecting part. And melting of the elastic deformation part is carried out promptly, and transfer to an external driving source of overload torque by the side of a compressor is intercepted certainly and promptly.
[0025]An elastic deformation part of an interposing member is constituted by thermoplastics material containing a filler in a power transmission device of the clutch loess variable displacement compressor according to claim 6. For this reason, intensity of an elastic deformation part improves by a reinforcing operation of a filler, and generating of unprepared transmitting power interception by small load torque is controlled.
[0026]
[Embodiment of the Invention]
(A 1st embodiment) Below, a 1st embodiment of this invention is described based on drawing 1 - drawing 3.
[0027]First, the composition of a clutch loess variable displacement compressor is explained. As shown in drawing 1, the front housing 12 which similarly constitutes some housing is joined to the front end of the cylinder block 11 which constitutes some housing. Junction immobilization of the rear housing 13 which constitutes some housing as well as the back end of the cylinder block 11 is carried out via the valve plate 14. The crankcase 15 which serves as a control pressure chamber is formed between the front housing 12 and the cylinder block 11.
[0028]Construction support of the driving shaft 16 is carried out pivotable between said front housing 12 and the cylinder block 11. The front end of the driving shaft 16 is projected from the crankcase 15 to the exterior, and the belt pulley 17 is attached firmly to the projecting end part. Operation connection of the belt pulley 17 is always carried out at the vehicle engine (graphic display abbreviation) which makes an external driving source via the belt 18.
[0029]The belt pulley 17 is supported by the front housing 12 via the angular bearing 19. And the load of an axial direction and the load of a radial direction which act on the belt pulley 17 are

responded to by the front housing 12 via the angular bearing 19.
[0030]The lip seal 20 intervenes between the front end part of the driving shaft 16, and the front housing 12. The lip seal 20 prevents the pressure leak in the crankcase 15.
[0031]while the rotating support 21 is attached firmly to the driving shaft 16 -- the cam plate 22 as a cam plate -- the axial direction of the driving shaft 16 -- a slide -- it is supported so that tilting is possible and possible. The guide pin 23 of the couple in which a tip part makes the shape of a ball is attached firmly to the cam plate 22. The suspension arm 24 protrudes on said rotating support 21, and the guide hole 25 of the couple is formed in the suspension arm 24. Said guide pin 23 is inserted in the guide hole 25 so that a slide is possible.
[0032]And by the cooperation with the suspension arm 24 and the guide pin 23 of a couple, the cam plate 22 can tilt to the axial direction of the driving shaft 16, and it is as pivotable as the driving shaft 16 in one. Tilting of the cam plate 22 is guided by the slide guide relation between the guide hole 25 and the guide pin 23, and the slide support action of the driving shaft 16. If the radius central part of the cam plate 22 moves to the cylinder block 11 side, the inclination of the cam plate 22 will decrease. The inclination restriction projection 21a for regulating the maximum inclination of the cam plate 22 is formed in the rear face of the rotating support 21.
[0033]The inclination reduction spring 26 intervenes between said rotating support 21 and the cam plate 22. And the cam plate 22 is energized toward the cylinder block 11 side with this inclination reduction spring 26 in the direction which decreases an inclination.
[0034]The receiving hole 27 is installed through the axial direction of the driving shaft 16 by the central part of the cylinder block 11, and it is formed in it so that the inner skin may serve as a diameter of the same mostly covering an overall length. In the receiving hole 27, insertion accommodation of the slide of the cylindrical cutoff body 28 is enabled from the rear-side of the cylinder block 11. The cutoff body 28 consists of the major diameter 28a and the narrow diameter portion 28b.
[0035]Into the pipe of the cutoff body 28, the rear end part of the driving shaft 16 is inserted. In the inner skin of the major diameter 28a, insertion support of the radial bearing 30 is carried out. The slip off stop of this radial bearing 30 is carried out out of the pipe of the cutoff body 28 by the circlip 31 attached to the inner skin of the major diameter 28a. And the rear end part of the driving shaft 16 is inserted in the radial bearing 30 so that a slide is possible, and it is supported by the peripheral surface of the receiving hole 27 via the radial bearing 30 and cutoff body 28.
[0036]The circular sulcus 27a is formed in the rear end inner periphery side of the receiving hole 27, and the circlip 27b is attached firmly to the circular sulcus 27a removable. The suction passage opening spring 29 intervenes between the level difference between the major diameter 28a of the cutoff body 28, and the narrow diameter portion 28b, and the circlip 27b. The elastic coefficient of this suction passage opening spring 29 is set up become smaller than the elastic coefficient of said inclination reduction spring 26, and the resultant of the energizing force of both the springs 26 and 29 is the power to the rear direction of a compressor. And the resultant of the energizing force of these springs 26 and 29 is acting on the cam plate 22, the thrust bearing 34 mentioned later, and the cutoff body 28.
[0037]The suction passage 32 which constitutes an inlet-pressure field is formed in the central part of the rear housing 13. The suction passage 32 is on the extension wire of the driving shaft 16 used as the moving trucking of the cutoff body 28. The opening of the suction passage 32 is carried out to the rear-side of the receiving hole 27, and the locating face 33 is formed in the circumference of the opening of the suction passage 32 by the side of the receiving hole 27. The locating face 33 is on the valve plate 14. The apical surface of the narrow diameter portion 28b of the cutoff body 28 can contact the locating face 33. And when the apical surface of the narrow diameter portion 28b contacts the locating face 33, movement in the direction of a rear-side of

the cutoff body 28 is regulated.
[0038]On the driving shaft 16 between the cam plate 22 and the cutoff body 28, the thrust bearing 34 is supported so that a slide of on the driving shaft 16 is possible. Rotation of the cam plate 22 has the transfer to the cutoff body 28 prevented by existence of the thrust bearing 34.
[0039]The **** type piston 35 is accommodated in two or more cylinder bores 11a installed by the cylinder block 11. Rotational movement of the cam plate 22 is changed into round trip-before and after each piston 35 rocking via the shoe 36 of a couple, and, as a result, longitudinal slide movement of the piston 35 is carried out within the cylinder bore 11a.
[0040]Into the rear housing 13, section forming of the inhalatorium 37 and the regurgitation room 38 is carried out. On the valve plate 14, corresponding to each cylinder bore 11a, the suction port 39 and the discharge port 40 are formed, and the suction valve portion 41 and the discharge valve 42 are formed so that it may correspond with these suction ports 39 and discharge ports 40.
[0041]By double-acting operation to a bottom dead point position from the upper dead point position of the piston 35, the refrigerant gas in the inhalatorium 37 pushes away the suction valve portion 41 from the suction port 39, and flows into the cylinder bore 11a. After the refrigerant gas which flowed into the cylinder bore 11a is compressed by the forward movement from the bottom dead point position of the piston 35 to an upper dead point position until it reached the predetermined pressure, it pushes away the discharge valve 42 from the discharge port 40, and is breathed out by it at the regurgitation room 38. In contact with the retainer 43, opening regulation of the discharge valve 42 is carried out.
[0042]The thrust bearing 44 intervenes between the rotating support 21 and the front housing 12. The thrust bearing 44 catches the compressive reaction which acts on the rotating support 21 via the piston 35, the shoe 36, the cam plate 22, and the guide pin 23 from the cylinder bore 11a.
[0043]The inhalatorium 37 is open for free passage to the receiving hole 27 via the vent hole 45. And when the cutoff body 28 contacts the locating face 33, the front end of the suction passage 32 is closed and the vent hole 45 is intercepted from the suction passage 32.
[0044]The axial center passage 46 is formed in the driving shaft 16. The opening of the entrance 46a of the axial center passage 46 is carried out to the crankcase 15 in the lip-seal 20 neighborhood, and it is carrying out the opening of the exit 46b of the axial center passage 46 into the pipe of the cutoff body 28. The pressure-discharge vent hole 47 is installed by the peripheral surface of the cutoff body 28. The pressure-discharge vent hole 47 is opening the receiving hole 27 for free passage in the pipe of the cutoff body 28.
[0045]Said regurgitation room 38 and the crankcase 15 are connected in the air supply passage 48. In the middle of the air supply passage 48, the capacity control valve 49 for opening and closing the air supply passage 48 is formed. Between said suction passage 32 and the capacity control valve 49, the pressure-taking passage 50 for drawing the suction pressure Ps in the capacity control valve 49 is formed.
[0046]The suction passage 32 used as the entrance at the time of introducing a refrigerant gas to the inhalatorium 37 and the discharge flange 51 which discharges a refrigerant gas from the regurgitation room 38 are connected in the external refrigerant circuit 52. All over the external refrigerant circuit 52, the condenser 53, the expansion valve 54, and the evaporator 55 intervene. The expansion valve 54 consists of a temperature type automatic expansion valve, and controls a refrigerant flow rate according to change of the gas temperature of the outlet side of the evaporator 55. The temperature sensor 56 is installed near the evaporator 55. The temperature sensor 56 detects the temperature in the evaporator 55, and this detection temperature information is sent to the control computer 57. The room temperature setter 58, the room temperature sensor 59, the air-conditioner operating switch 60, and engine speed sensor 61 grade for specifying the temperature of the car interior of a room of vehicles are connected to the

control computer 57.
[0047]The room temperature as which the control computer 57 was beforehand specified by the room temperature setter 58, for example, Based on external signals, such as the one or the OFF signal from the detection temperature acquired from the temperature sensor 56, the detection temperature acquired from the room temperature sensor 59, and the air-conditioner operating switch 60, and an engine speed value obtained from the engine speed sensor 61, the drive circuit 62 is ordered an input current value. The drive circuit 62 is outputted to the coil 84 of the solenoid mechanism 65 of the capacity control valve 49 which mentions the ordered input current value later. As other external signals, there is a signal from an outdoor temperature sensor, for example, and an input current value is determined according to the environment of vehicles.
[0048]Said capacity control valve 49 joins the valve housing 64 and the solenoid mechanism 65 in near a center, and is constituted. Between the valve housing 64 and the solenoid mechanism 65, section forming of the valve chest 66 is carried out, and the valve element 67 is accommodated in the valve chest 66. The opening of the valve port 68 is carried out to the valve chest 66 so that it may counter with the valve element 67. This valve port 68 is formed so that it may extend in the axial direction of the valve housing 64. The compulsive opening spring 69 is infixed between the valve element 67 and the internal surface of the valve chest 66, and the valve element 67 is energized to the opening direction of the valve port 68. This valve chest 66 is opened for free passage by the regurgitation room 38 in the rear housing 13 via the valve chest port 70 and said air supply passage 48.
[0049]Section forming of the pressure-sensitive room 71 is carried out to the upper part of the valve housing 64. This pressure-sensitive room 71 is opened for free passage by the suction passage 32 of the rear housing 13 via the suction pressure introduction port 72 and said pressure-taking passage 50. The bellows 73 is accommodated in the inside of the pressure-sensitive room 71. Between the pressure-sensitive room 71 of the valve housing 64, and said valve chest 66, the pressure-sensitive rod guide 74 which follows said valve port 68 is formed. In the pressure-sensitive rod guide 74, the pressure-sensitive rod 75 is inserted in so that sliding is possible. Operation connection of said valve element 67 and said bellows 73 is carried out by this pressure-sensitive rod 75. The portion of the side joined to the valve element 67 of the pressure-sensitive rod 75 is a byway in order to secure the passage of the refrigerant gas in the valve port 68.
[0050]The port 76 is formed in the valve housing 64 so that it may intersect perpendicularly with said valve port 68 between the valve chest 66 and the pressure-sensitive room 71. The port 76 is opened for free passage by the crankcase 15 via the air supply passage 48. That is, the valve chest port 70, the valve chest 66, the valve port 68, and the port 76 constitute said a part of air supply passage 48.
[0051]The fixed iron core 78 fits into the upper opening of the chamber houses 77 of said solenoid mechanism 65, and the solenoid chamber 79 is divided by this fixed iron core 78 in the chamber houses 77. The moving core 80 which makes roofed cylindrical shape mostly is reciprocatably accommodated in the solenoid chamber 79. The flattery spring 81 is infixed between the moving core 80 and the bottom of the chamber houses 77. This flattery spring 81 is what has an elastic coefficient smaller than said compulsive opening spring 69.
[0052]The solenoid rod guide 82 which opens the solenoid chamber 79 and the valve chest 66 for free passage is formed in said fixed iron core 78. The solenoid rod 83 is said valve element 67 and really formed, and in the solenoid rod guide 82, is inserted in so that sliding is possible. The end by the side of the moving core 80 of the solenoid rod 83 is contacted by the moving core 80 according to the energizing force of said compulsive opening spring 69 and the flattery spring 81. And operation connection of said moving core 80 and the valve element 67 is carried out via the

solenoid rod 83.

[0053]The cylindrical coil 84 is arranged at the outside of said fixed iron core 78 and the moving core 80 so that both the iron cores 78 and 80 may be straddled. Based on instructions of said control computer 57, predetermined current is supplied to this coil 84 from the drive circuit 62.

[0054]Next, the power transmission device attached decoratively between said driving shaft 16 and the belt pulley 17 is explained. As shown in drawing 1 and drawing 2, with the bolt 87 screwed at the tip of the driving shaft 16, via the plate spring 88 as a pressure contact means, the transmitting power object 86 is really pivotable in the projecting end part of the driving shaft 16, and is attached firmly to it movable to the axial direction. This power transmission member 86 is formed in disc-like with iron system metal material, and while the boss section 86a protrudes in that center of an inner surface, the annular bond part 86b protrudes on the inner surface periphery.

[0055]Fit-in support of the interposing member 89 is carried out at the boss section 86a of the transmitting power object 86 so that it may be allocated between the facing end faces of said transmitting power object 86 and the belt pulley 17. This interposing member 89 comprises the disc-like elastic deformation board 90, two or more connecting pins 91 as a connecting part which protruded on the end face by the side of the belt pulley 17 of that elastic deformation board 90, and the circular friction material 92 laid under the end face by the side of the transmitting power object 86 of the elastic deformation board 90 as an elastic deformation part. The elastic deformation board 90, for example Glass fiber, an aramid fiber, an alumina fiber, Silicon carbide fiber, a silicon carbide whisker, a potassium titanate whisker, Fillers, such as talc, mica, and clay, contained, for example, are formed with thermoplastics materials, such as polypropylene, polyamide, polyester, polyacetal, PORI carbonate, an acrylic resin, an AS resin, ABS plastics, and alloy resin of these resin. The connection pin 91 is formed with iron system metal material, and burial immobilization is carried out in the narrow diameter portion 91a of the end face at the elastic deformation board 90.

[0056]And the transmitting power object 86 and the interposing member 89 are forced by the energizing force of said plate spring 88 toward the belt pulley 17 side. Thereby, press junction of the bond part 86b of the transmitting power object 86 is carried out at the friction material 92 of the interposing member 89, and frictional coupling of the transmitting power object 86 and the interposing member 89 is always carried out. With this, each connecting pin 91 of the interposing member 89 is welded by pressure to the end face of the belt pulley 17 which consists of iron system metal material, and the interposing member 89 rotates [belt pulley / 17] in one in a usual state.

[0057]In the state where rotation is transmitted to the driving shaft 16 via the interposing member 89 and the transmitting power object 86 from the belt pulley 17, when the load torque by the side of the driving shaft 16 is changed, the elastic deformation board 90 of the interposing member 89 carries out elastic deformation, and change of the load torque is eased.

[0058]When the load torque by the side of the driving shaft 16 becomes excessive, relative sliding arises in the pressure welding part between the connecting pin 91 of the interposing member 89, and the belt pulley 17, and frictional heat occurs. This frictional heat is transmitted to the narrow diameter portion 91a side of the connecting pin 91, and melting of the elastic deformation board 90 of the interposing member 89 is carried out in the portion in contact with the narrow diameter portion 91a of the connecting pin 91. And by the molten state of this elastic deformation board 90, as a broken chain line shows to drawing 2, the idling slot 93 is formed in the side of the elastic deformation board 90 of the narrow diameter portion 91a of the connecting pin 91, and relative rotating of the connecting pin 91 is carried out after that to the elastic deformation board 90.

[0059]Next, operation of the clutch loess variable displacement compressor constituted as

mentioned above is explained. Now, when the detection temperature from which the air-conditioner operating switch 60 is obtained from the room temperature sensor 59 under an ON state is more than the preset temperature of the room temperature setter 58, the control computer 57 orders it magnetization of the solenoid mechanism 65. Then, predetermined current is supplied to the coil 84 via the drive circuit 62, and as shown in drawing 1, among both the iron cores 78 and 80, the suction force according to an input current value arises. This suction force resists the energizing force of the compulsive opening spring 69, is made into the power of a direction in which a valve opening decreases, and is transmitted to the valve element 67 via the solenoid rod 83.

[0060]On the other hand, in the excited state of this solenoid mechanism 65, the bellows 73 is displaced according to change of the suction pressure Ps introduced into the pressure-sensitive room 71 via the pressure-taking passage 50 from the suction passage 32. And the displacement according to the suction pressure Ps of this bellows 73 is told to the valve element 67 via the pressure-sensitive rod 75. Therefore, as for the capacity control valve 49, a valve opening is determined by the balance of the energizing force from the solenoid mechanism 65, the energizing force from the bellows 73, and the energizing force of the compulsive opening spring 69.

[0061]When cooling load is large, the difference of the temperature detected, for example by the room temperature sensor 59 and the preset temperature of the room temperature setter 58 becomes large. The control computer 57 controls an input current value to change a setting-out inlet pressure based on detection temperature and a setting-out room temperature. That is, to the drive circuit 62, it is ordered the control computer 57 so that detection temperature is high, and an input current value may be enlarged. Therefore, the suction force between the fixed iron core 78 and the moving core 80 becomes strong, and the energizing force to the direction which makes the valve opening of the valve element 67 small increases. And opening and closing of the valve element 67 are performed by the lower suction pressure Ps. Therefore, when a current value increases, the capacity control valve 49 operates so that the lower suction pressure Ps may be held.

[0062]If the valve opening of the valve element 67 becomes small, the amount of refrigerant gases which flows into the crankcase 15 via the air supply passage 48 from the regurgitation room 38 will decrease. On the other hand, the refrigerant gas in the crankcase 15 is flowing into the inhalatorium 37 via the axial center passage 46 and the pressure-discharge vent hole 47. For this reason, the pressure Pc in the crankcase 15 declines. In the state where cooling load is large, the pressure in the cylinder bore 11a is also high, and the difference of the pressure Pc in the crankcase 15 and the pressure in the cylinder bore 11a becomes small. For this reason, the inclination of the cam plate 22 becomes large.

[0063]If the passing cross section in the air supply passage 48 becomes zero, i.e., the state where the valve element 67 of the capacity control valve 49 stopped the valve port 68 thoroughly, supply of high pressure refrigerant gas to the crankcase 15 from the regurgitation room 38 will no longer be performed. And the pressure Pc in the crankcase 15 becomes almost the same as that of the pressure Ps in the inhalatorium 37, and the inclination of the cam plate 22 serves as the maximum. The maximum inclination of the cam plate 22 is regulated by the contact to the inclination restriction projection 21a of the rotating support 21, and the cam plate 22, and discharging volume serves as the maximum.

[0064]On the contrary, when cooling load is small, the difference of the temperature detected, for example by the room temperature sensor 59 and the preset temperature of the room temperature setter 58 becomes small. To the drive circuit 62, it is ordered the control computer 57 so that detection temperature is low, and an input current value may be made small. For this reason, the suction force between the fixed iron core 78 and the moving core 80 becomes weak, and the

energizing force to the direction which makes the valve opening of the valve element 67 small decreases. And opening and closing of the valve element 67 are performed by the higher suction pressure Ps. Therefore, when a current value decreases, the capacity control valve 49 operates so that the higher suction pressure Ps may be held.

[0065]If the valve opening of the valve element 67 becomes large, the amount of refrigerant gases which flows into the crankcase 15 from the regurgitation room 38 will increase, and the pressure Pc in the crankcase 15 will rise. In the state where this cooling load is small, the pressure in the cylinder bore 11a is low, and the difference of the pressure Pc in the crankcase 15 and the pressure in the cylinder bore 11a becomes large. For this reason, the inclination of the cam plate 22 becomes small.

[0066]If the state where there is no cooling load is approached, it will fall so that the temperature in the evaporator 55 may approach the temperature which brings about frothed generating. If the detection temperature from the temperature sensor 56 turns into below preset temperature, the control computer 57 will order it demagnetization of the solenoid mechanism 65 to the drive circuit 62. Said preset temperature reflects the situation where Frost is likely to be generated in the evaporator 55. And supply of the current to the coil 84 is suspended, the solenoid mechanism 65 is demagnetized, and the suction force of the fixed iron core 78 and the moving core 80 disappears.

[0067]For this reason, as shown in drawing 3, the valve element 67 resists the energizing force of the flattery spring 81 which acts via the moving core 80 and the solenoid rod 83 according to the energizing force of the compulsive opening spring 69, and is moved caudad. And the valve element 67 shifts to the valve opening position which opened the valve port 68 to the maximum. Therefore, the high pressure refrigerant gas in the regurgitation room 38 is supplied to the crankcase 15 so much via the air supply passage 48, and the pressure Pc in the crankcase 15 becomes high. By the pressure buildup in this crankcase 15, the inclination of the cam plate 22 shifts to minimum inclination.

[0068]Based on the OFF signal of the air-conditioner operating switch 60, the control computer 57 orders it demagnetization of the solenoid mechanism 65, and the inclination of the cam plate 22 shifts to minimum inclination also by this demagnetization.

[0069]Thus, the switching action of the capacity control valve 49 changes according to the size of an input current value to the coil 84. If an input current value becomes large, opening and closing will be performed by the low suction pressure Ps, and if an input current value becomes small, a switching action will be performed by the high suction pressure Ps. A compressor changes the inclination of the cam plate 22 and changes the discharging volume so that the set-up suction pressure Ps may be maintained. That is, the capacity control valve 49 is bearing the role which changes an input current value and changes the preset value of the suction pressure Ps, and the role which performs minimum capacity operation regardless of the suction pressure Ps. By providing such a capacity control valve 49, the compressor is bearing the role which changes the refrigerating capacity of a refrigeration circuit.

[0070]Tilting of the cam plate 22 is transmitted to the cutoff body 28 via the thrust bearing 34 with movement by the side of the cutoff body 28 of said cam plate 22. The cutoff body 28 resists the energizing force of the suction passage opening spring 29 by this tilting transfer, and it is moved to the locating face 33 side. Here, the cutoff body 28 decreases the passing cross section of the suction passage 32 gradually. Wire drawing by this slow passing cross section change decreases gradually the refrigerant-gas inflow from the suction passage 32 to the inhalatorium 37. For this reason, the amount of refrigerant gases inhaled into the cylinder bore 11a from the inhalatorium 37 also decreases gradually, and discharging volume decreases gradually. Therefore, discharge-pressure Pd decreases gradually and the load torque in a compressor is not changed

sharply for a short time. As a result, change of the load torque in the clutch loess variable displacement compressor [it results in the minimum discharging volume from the maximum discharging volume] of a between becomes slow, and the shock by change of load torque is eased.

[0071]If the inclination of the cam plate 22 becomes the minimum as shown in drawing 3, the cutoff body 28 will contact the locating face 33, and the suction passage 32 will be intercepted. In this state, the passing cross section in the suction passage 32 serves as zero, and the refrigerant-gas inflow to the inhalatorium 37 is prevented from the external refrigerant circuit 52. The minimum inclination of this cam plate 22 is set up become a slightly bigger predetermined value than 0 degree. This minimum inclination state is brought about when the cutoff body 28 has been arranged in the closed position which intercepts a free passage with the suction passage 32 and the receiving hole 27. The cutoff body 28 is interlocked with rocking of the cam plate 22, and is switched and arranged to said closed position and the open position estranged from this position.

[0072]Since the minimum inclination of the cam plate 22 is not 0 degree, also in the minimum inclination state, the regurgitation of the refrigerant gas from the cylinder bore 11a to the regurgitation room 38 is performed. The refrigerant gas breathed out at the regurgitation room 38 flows into the crankcase 15 through the air supply passage 48 from the cylinder bore 11a. The refrigerant gas in the crankcase 15 flows into the inhalatorium 37 through the axial center passage 46, the pressure-discharge vent hole 47, and the vent hole 45. The refrigerant gas in the inhalatorium 37 is inhaled into the cylinder bore 11a, and is breathed out again at the regurgitation room 38.

[0073]That is, in the state of minimum inclination, the regurgitation room 38, the air supply passage 48, the crankcase 15, the axial center passage 46, the pressure-discharge vent hole 47, the receiving hole 27, the vent hole 45, the inhalatorium 37, and the circulating passage that goes via the cylinder bore 11a are formed in the compressor. And the pressure differential has arisen between the regurgitation room 38, the crankcase 15, and the inhalatorium 37. Therefore, a refrigerant gas circulates through said circulating passage, and the lubricating oil which flows with a refrigerant gas carries out the lubrication of each sliding part in a compressor.

[0074]If the temperature of the car interior of a room rises and cooling load increases in the state where the air-conditioner operating switch 60 is in an ON state, and the cam plate 22 is in a minimum inclination position, the temperature detected by the room temperature sensor 59 will exceed the preset temperature of the room temperature setter 58. The control computer 57 orders it magnetization of the solenoid mechanism 65 based on this detection temperature change. The air supply passage 48 is closed by magnetization of the solenoid mechanism 65, and the pressure Pc of the crankcase 15 decompresses based on pressure discharge through the axial center passage 46 and the pressure-discharge vent hole 47. With this decompression, the suction passage opening spring 29 develops from the reduction state of drawing 3. And the cutoff body 28 estranges from the locating face 33, and the inclination of the cam plate 22 increases from the minimum inclination state of drawing 3.

[0075]With alienation of this cutoff body 28, the passing cross section in the suction passage 32 increases slowly, and refrigerant-gas inflow's from the suction passage 32 to the inhalatorium 37 increases gradually. Therefore, the amount of refrigerant gases inhaled into the cylinder bore 11a from the inhalatorium 37 also increases gradually, and discharging volume increases gradually. Therefore, discharge-pressure Pd increases gradually and the load torque in a compressor is not changed sharply for a short time. As a result, change of the load torque in the clutch loess variable displacement compressor [it results in the maximum discharging volume from the minimum discharging volume] of a between becomes slow, and the shock by change of load

torque is eased.

[0076]If the vehicle engine which makes an external driving source stops, operation of a compressor will also suspend a stop, i.e., rotation of the cam plate 22, and the energization to the coil 84 of the capacity control valve 49 will also be stopped. For this reason, the solenoid mechanism 65 is demagnetized, the air supply passage 48 is opened wide, and the inclination of the cam plate 22 serves as the minimum.

[0077]Next, operation of the power transmission device attached decoratively between said driving shaft 16 and the belt pulley 17 is explained. Now, in this power transmission device, while frictional coupling of the bond part 86b of the transmitting power object 86 is carried out to the friction material 92 of the interposing member 89 by the energizing force of the plate spring 88, each connecting pin 91 of the interposing member 89 is welded by pressure to the end face of the belt pulley 17. For this reason, when the belt pulley 17 always rotates via the belt 18 with the vehicle engine as an external driving source, that rotation is transmitted to the driving shaft 16 via the interposing member 89 and the transmitting power object 89, and compression operation of the compressor is carried out.

[0078]If the load torque by the side of a compressor is changed at the time of operation of this compressor, the elastic deformation board 90 of the interposing member 89 will carry out elastic deformation, and change of that load torque will be eased. For this reason, change of the load torque by the side of a compressor does not affect the vehicle engine side as an external driving source, and it can control changing the number of rotations of that vehicle engine.

[0079]If the load torque by the side of a compressor becomes excessive, relative sliding will arise in the pressure welding part between the connecting pin 91 of the interposing member 89, and the belt pulley 17, and frictional heat will occur. And this frictional heat is transmitted to the elastic deformation board 90 through each connecting pin 91, and melting of that elastic deformation board 90 is carried out near narrow diameter portion 91a of the connecting pin 91. As a broken chain line shows to drawing 2 by the molten state of this elastic deformation board 90, the idling slot 93 is formed in the side of the elastic deformation board 90 of the narrow diameter portion 91a of the connecting pin 91, and relative rotating of the connecting pin 91 is carried out after that to the elastic deformation board 90 in this idling slot 93. It can control transfer of the overload torque from the driving shaft 16 to the belt pulley 17 being intercepted, and having an adverse effect on vehicle engine by this.

[0080]An effect expectable by the aforementioned embodiment is indicated below.

(a) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, when the load torque by the side of the driving shaft 16 is changed, the elastic deformation board 90 of the interposing member 89 which consists of thermoplastics material carries out elastic deformation. When the load torque by the side of the driving shaft 16 becomes excessive, relative sliding arises in the pressure welding part between the interposing member 89 and the belt pulley 17, frictional heat occurs in it, and melting of the elastic deformation board 90 of the interposing member 89 is carried out to it by the frictional heat. For this reason, although structure is easy, while being able to ease effectively change of the load torque by the side of a compressor, transfer of the overload torque to the vehicle engine which makes an external driving source can be intercepted certainly.

[0081](b) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, the elastic deformation board 90 of the interposing member 89 is formed with thermoplastics material. For this reason, even when a compressor is used by the low temperature environment of a cold district etc., change of the elasticity of the elastic deformation board 90 can be suppressed small. Therefore, it can control that it becomes impossible to ease change of load torque effectively, and it fractures carelessly under low temperature environment even if the

elastic deformation board 90 is not big load torque.

[0082](c) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, when the load torque by the side of a compressor becomes excessive, relative sliding arises in the pressure welding part between the connecting pin 91 of the interposing member 89, and the belt pulley 17, and frictional heat occurs. For this reason, frictional heat is transmitted to the elastic deformation board 90 from the connecting pin 91, melting of that elastic deformation board 90 is carried out near narrow diameter portion 91a of the connecting pin 91, and relative rotating of the connecting pin 91 comes to be carried out to the elastic deformation board 90 after that. Therefore, transfer of the overload torque from the driving shaft 16 to the belt pulley 17 can be intercepted certainly.

[0083](d) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, the connecting pin 91 of the interposing member 89 is formed with a thermally conductive and rigid high iron system metal material. For this reason, in the composition of said embodiment welded by pressure to the belt pulley 17 which consists of metallic materials, the frictional heat accompanying the relative sliding of a pressure welding part is promptly transmitted to the elastic deformation board 90 from the connecting pin 91, and especially the connecting pin 91 of the interposing member 89 can fuse that elastic deformation board 90 promptly. Therefore, transfer of the overload torque from the driving shaft 16 to the belt pulley 17 can be intercepted promptly and certainly.

[0084](e) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, the elastic deformation board 90 of the interposing member 89 is constituted by the thermoplastics material containing a filler. For this reason, the intensity of the elastic deformation board 90 improves by the reinforcing operation of a filler, and generating of the unprepared transmitting power interception by small load torque is controlled.

[0085](A 2nd embodiment), next a 2nd embodiment of this invention are described focusing on a different portion from said 1st embodiment.

[0086]In the power transmission device of this 2nd embodiment, as shown in drawing 4, while the connecting pin 91 of the interposing member 89 protrudes on the end face by the side of the transmitting power object 86 of the elastic deformation board 90, the friction material 92 is laid under the end face by the side of the belt pulley 17 of the elastic deformation board 90. Formed protruding of the circular bond part 96 is carried out to the end face of the belt pulley 17. And while frictional coupling of the friction material 92 of the interposing member 89 is carried out to the bond part 96 of the belt pulley 17 by the energizing force of the plate spring 88, the connecting pin 91 of the interposing member 89 is welded by pressure to the bond part 86b of the transmitting power object 86 by it.

[0087]Therefore, also in this 2nd embodiment, almost like a 1st embodiment mentioned above, if the load torque by the side of a compressor is changed at the time of operation of a compressor, the elastic deformation board 90 of the interposing member 89 will carry out elastic deformation, and change of that load torque will be eased. For this reason, it can control change of the load torque by the side of a compressor affecting the vehicle engine side as an external driving source, and changing the number of rotations of that vehicle engine.

[0088]If the load torque by the side of a compressor becomes excessive, relative sliding will arise in the pressure welding part between the connecting pin 91 of the interposing member 89, and the transmitting power object 86, and frictional heat will occur. And this frictional heat is transmitted to the elastic deformation board 90 through each connecting pin 91, and melting of that elastic deformation board 90 is carried out near narrow diameter portion 91a of the connecting pin 91. By the molten state of this elastic deformation board 90, the idling slot 93 is formed in the side of the elastic deformation board 90 of the narrow diameter portion 91a of the connecting pin 91, and

relative rotating of the connecting pin 91 is carried out after that to the elastic deformation board 90. It can control transfer of the overload torque from the driving shaft 16 to the belt pulley 17 being intercepted, and having an adverse effect on vehicle engine by this.

[0089](A 3rd embodiment), next a 3rd embodiment of this invention are described focusing on a different portion from said 1st embodiment.

[0090]Now, as the power-transmission-device smell of this 3rd embodiment is shown in drawing 5, two or more fitting recesses 97 are formed in the end face of the belt pulley 17, the connecting pin 91 of the interposing member 89 fits into these fitting recesses 97, and the interposing member 89 and the belt pulley 17 are really combined pivotable. The split-face-like pressure welding face 98 is formed in the elastic deformation board 90 of the bond part 86b of the transmitting power object 86, and the field which counters. And this pressure welding face 98 is welded by pressure to the elastic deformation board 90 by the energizing force of the plate spring 88.

[0091]Therefore, also in this 3rd embodiment, almost like a 1st embodiment mentioned above, when the load torque by the side of a compressor is changed, the elastic deformation board 90 of the interposing member 89 carries out elastic deformation, change of that load torque is eased, and influencing of the torque variation by the side of vehicle engine is controlled.

[0092]When the load torque by the side of a compressor becomes excessive, relative sliding arises in the pressure welding part between the elastic deformation board 90 of the interposing member 89, and the pressure welding face 98 of the transmitting power object 86, and frictional heat occurs. And by this frictional heat, melting of the pressure welding face 98 of the elastic deformation board 90 and the portion which counters is carried out, and transfer of the overload torque from the driving shaft 16 to the belt pulley 17 is intercepted. Therefore, it can control that the overload torque by the side of a compressor has an adverse effect on vehicle engine.

[0093]After the overload torque by the side of a compressor settles down and generation of heat of said pressure welding part is subsided, the pressure welding face 98 of the elastic deformation board 90 of the interposing member 89 and the portion which counters are re-solidified from a molten state. For this reason, it is not necessary to carry out desorption exchange of the interposing member 89 with a new thing, and the transmitting power from the belt pulley 17 to the driving shaft 16 can be resumed.

[0094](A 4th embodiment), next a 4th embodiment of this invention are described focusing on a different portion from said 1st embodiment.

[0095]Now, as the power-transmission-device smell of this 4th embodiment is shown in drawing 6, to the projecting end part of the driving shaft 16, the elastic deformation board 90 of the interposing member 89 is really pivotable, and joint firm attachment is carried out movable to the axial direction. And this elastic deformation board 90 makes a transmitting power object serve a double purpose. As for this interposing member 89, the connecting pin 91 of the eclipse with direct aggressiveness and the interposing member 89 is welded by pressure to the end face of the belt pulley 17 toward the belt pulley 17 side with the plate spring 88.

[0096]Therefore, also in this 4th embodiment, almost like a 1st embodiment mentioned above, when the load torque by the side of a compressor is changed, the elastic deformation board 90 of the interposing member 89 carries out elastic deformation, and change of that load torque is eased. When load torque becomes excessive, relative sliding arises in the pressure welding part between the connecting pin 91 and the belt pulley 17, frictional heat occurs, melting of the elastic deformation board 90 is carried out by the frictional heat, and transfer of overload torque is intercepted. Therefore, the almost same effect as said 1st embodiment can be demonstrated.

[0097]In this 4th embodiment, joint firm attachment is carried out and the elastic deformation board 90 of the interposing member 89 both [object / driving shaft / 16 / transmitting power]

uses. For this reason, while not installing a transmitting power object separately to the driving shaft 16 and being able to reduce part mark, the weight saving of a compressor can be attained.
[0098]This invention can change as follows and can also take shape.
(1) In the power transmission device of each of said embodiment, form the connecting part of the interposing member 89 in a circle with iron system metal material, and constitute to lay under the elastic deformation board 90 two or more pins which protruded on the rear face.
[0099](2) Provide an energizing member which is different in the plate spring 88 as a pressure contact means in the power transmission device of each of said embodiment.
(3) While forming the fitting recess 97 on the transmitting power object 86 and making the connecting pin 91 of the interposing member 89 fit into the fitting recess 97 in said 3rd embodiment, Form the split-face-like pressure welding face 98 on the elastic deformation board 90 of the interposing member 89 of the belt pulley 17, and the field which counters, and constitute to make the pressure welding face 98 of the belt pulley 17 weld by pressure to the elastic deformation board 90.
[0100]Even if constituted like these, the almost same operation as said each embodiment and an effect can be acquired.
[0101]
[Effect of the Invention]Since this invention is constituted as mentioned above, it does the following effects so. According to the invention according to claim 1, when the load torque by the side of a driving shaft is changed, the elastic deformation part of the interposing member which consists of thermoplastics material carries out elastic deformation. When the load torque by the side of a driving shaft becomes excessive, relative sliding arises in the pressure welding part between an interposing member, a driving shaft, or a belt pulley, frictional heat occurs in it, and melting of the elastic deformation part of an interposing member is carried out to it by the frictional heat. For this reason, although structure is easy, while being able to ease effectively change of the load torque by the side of a compressor, without causing a depression under low temperature environment, transfer of overload torque can be intercepted certainly.
[0102]According to the invention according to claim 2, when the load torque by the side of a compressor becomes excessive, relative sliding arises in the pressure welding part between the connecting part of an interposing member, a transmitting power object, or a belt pulley, and frictional heat occurs. By this, frictional heat is transmitted to the elastic deformation part of an interposing member from a connecting part, melting of the elastic deformation part is carried out, and relative rotating of the connecting part comes to be carried out to an elastic deformation part after that. For this reason, transfer of the overload torque from a driving shaft to a belt pulley can be intercepted certainly.
[0103]According to the invention according to claim 3, when the load torque by the side of a compressor becomes excessive, relative sliding arises in the pressure welding part between the elastic deformation part of an interposing member, a transmitting power object, or a belt pulley, and frictional heat occurs. Thereby, melting of near the pressure welding part of an elastic deformation part is carried out, and transfer of the overload torque from a driving shaft to a belt pulley is intercepted. For this reason, after the overload torque by the side of a compressor settles down and generation of heat of a pressure welding part is subsided, near the pressure welding part of the elastic deformation part of an interposing member is re-solidified from a molten state, and transmitting power can be resumed.
[0104]According to the invention according to claim 4, joint firm attachment is carried out and the elastic deformation part of an interposing member both [object / driving shaft / transmitting power] uses. For this reason, while not installing a transmitting power object separately to a driving shaft and being able to reduce part mark, the weight saving of a compressor can be

attained.

[0105]According to the invention according to claim 5, the connecting part of the interposing member is formed with a thermally conductive and rigid high iron system metal material. For this reason, the frictional heat accompanying the relative sliding of a pressure welding part is promptly transmitted to the elastic deformation part of an interposing member from a connecting part, and that elastic deformation part can be fused promptly. Therefore, transfer of the overload torque from a driving shaft to a belt pulley can be intercepted promptly and certainly.

[0106]According to the invention according to claim 6, the elastic deformation part of the interposing member is constituted by the thermoplastics material containing a filler. For this reason, the intensity of an elastic deformation part can improve and generating of the unprepared transmitting power interception by small load torque can be controlled.

[Translation done.]

TECHNICAL FIELD

[Field of the Invention]This invention relates to the power transmission device in the clutch loess variable displacement compressor which was always made to carry out operation connection of an external driving source and the driving shaft via the belt and the belt pulley.

[Translation done.]

PRIOR ART

[Description of the Prior Art]Generally, the clutch loess variable displacement compressor is not provided with the electromagnetic clutch for performing connection and interception of transmitting power between the external driving source and the driving shaft of a compressor. For this reason, in especially a vehicles mount condition, the badness of the somesthesis feeling accompanying the shock of intermittence of an electromagnetic clutch is cancelable. Since said electromagnetic clutch has power consumption and large weight, saving-power-izing of a compressor, reduction of the whole weight, and reduction of cost can be aimed at.
[0003]However, in such a clutch loess variable displacement compressor, the vehicle engine which makes an external driving source is affected directly, without easing change of the load torque by the side of a compressor. For this reason, there was a possibility of changing the operational status of vehicle engine, by change of the load torque by the side of a compressor.
[0004]In order to cope with such a problem, a clutch loess variable displacement compressor which is indicated by JP,63-142460,U (the 1st gazette) and JP,8-121332,A (the 2nd gazette), for example is proposed from the former.
[0005]In the compressor indicated by the 1st gazette, while an engaging recess is provided in the annular **-like wall formed in the belt pulley, the engaging recess is provided in the peripheral surface of the hub. One end of a drive lever is inserted in the engaging recess by the side of a **-like wall, and the other end of the drive lever is inserted in the engaging recess by the side of a hub via the annular flat spring. And rotation of a belt pulley is usually transmitted to a driving shaft via a drive lever and a flat spring.
[0006]When the load torque by the side of a compressor is changed, change of the load torque is eased by rocking of a drive lever, and the elastic deformation of a flat spring, and the engine speed fluctuation of the vehicle engine resulting from change of load torque is controlled. When the load torque by the side of a compressor becomes excessive, the other end of a drive lever separates from the crevice of a flat spring, and excessive load torque affects the vehicle engine side.
[0007]On the other hand, in the compressor indicated by the 2nd gazette, a transmitting power object is attached firmly to the end of a driving shaft, and the annular rubber damper is infixed between the peripheral face of this transmitting power object, and the inner skin of a belt pulley. The inner skin of this India rubber is combined with a transmitting power object by adhesives, and the peripheral face of the rubber damper is combined with the belt pulley by adhesives.
[0008]And rotation of a belt pulley is usually transmitted to a driving shaft via a rubber damper and a transmitting power object. Here, when the load torque by the side of a compressor is changed, change of the load torque is eased by the elastic deformation of a rubber damper, and the engine speed fluctuation of the vehicle engine resulting from change of load torque is

controlled. When the load torque by the side of a compressor becomes excessive, the rubber damper itself fractures and excessive load torque affects the vehicle engine side.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention]Since this invention is constituted as mentioned above, it does the following effects so. According to the invention according to claim 1, when the load torque by the side of a driving shaft is changed, the elastic deformation part of the interposing member which consists of thermoplastics material carries out elastic deformation. When the load torque by the side of a driving shaft becomes excessive, relative sliding arises in the pressure welding part between an interposing member, a driving shaft, or a belt pulley, frictional heat occurs in it, and melting of the elastic deformation part of an interposing member is carried out to it by the frictional heat. For this reason, although structure is easy, while being able to ease effectively change of the load torque by the side of a compressor, without causing a depression under low temperature environment, transfer of overload torque can be intercepted certainly.
[0102]According to the invention according to claim 2, when the load torque by the side of a compressor becomes excessive, relative sliding arises in the pressure welding part between the connecting part of an interposing member, a transmitting power object, or a belt pulley, and frictional heat occurs. By this, frictional heat is transmitted to the elastic deformation part of an interposing member from a connecting part, melting of the elastic deformation part is carried out, and relative rotating of the connecting part comes to be carried out to an elastic deformation part after that. For this reason, transfer of the overload torque from a driving shaft to a belt pulley can be intercepted certainly.
[0103]According to the invention according to claim 3, when the load torque by the side of a compressor becomes excessive, relative sliding arises in the pressure welding part between the elastic deformation part of an interposing member, a transmitting power object, or a belt pulley, and frictional heat occurs. Thereby, melting of near the pressure welding part of an elastic deformation part is carried out, and transfer of the overload torque from a driving shaft to a belt pulley is intercepted. For this reason, after the overload torque by the side of a compressor settles down and generation of heat of a pressure welding part is subsided, near the pressure welding part of the elastic deformation part of an interposing member is re-solidified from a molten state, and transmitting power can be resumed.
[0104]According to the invention according to claim 4, joint firm attachment is carried out and the elastic deformation part of an interposing member both [object / driving shaft / transmitting power] uses. For this reason, while not installing a transmitting power object separately to a driving shaft and being able to reduce part mark, the weight saving of a compressor can be attained.
[0105]According to the invention according to claim 5, the connecting part of the interposing member is formed with a thermally conductive and rigid high iron system metal material. For this reason, the frictional heat accompanying the relative sliding of a pressure welding part is promptly

transmitted to the elastic deformation part of an interposing member from a connecting part, and that elastic deformation part can be fused promptly. Therefore, transfer of the overload torque from a driving shaft to a belt pulley can be intercepted promptly and certainly.

[0106]According to the invention according to claim 6, the elastic deformation part of the interposing member is constituted by the thermoplastics material containing a filler. For this reason, the intensity of an elastic deformation part can improve and generating of the unprepared transmitting power interception by small load torque can be controlled.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, in the conventional compressor indicated by the 1st gazette, two or more drive levers are supported rockable, and the oscillation displacement of a drive lever is responded to with a flat spring. For this reason, the structure of the power transmission device was complicated, part mark and an attachment man day increased, and there was a problem that the cost of a compressor became high.
[0010]In the conventional compressor indicated by the 2nd gazette, the annular rubber damper is infixed between the transmitting power object and the belt pulley. Here, when a compressor is used in a cold district etc. by low temperature environment lower than the glass transition temperature of the rubber material of a rubber damper, there is a possibility that a rubber material may carry out low temperature embrittlement. In the state of this low temperature embrittlement, a rubber material becomes hard, and while that elasticity falls greatly, it becomes weak. For this reason, there was a problem that there was a possibility that it becomes impossible to ease change of load torque effectively, and it may fracture carelessly even if a rubber damper is not big load torque.
[0011]This invention is made paying attention to the problem which exists in such a Prior art. Although the place made into the purpose is simple for structure, while there is almost no depression under low temperature environment and being able to ease effectively change of the load torque by the side of a compressor, It is in providing the power transmission device of the clutch loess variable displacement compressor which can intercept transfer of overload torque certainly.

[Translation done.]

* NOTICES *

MEANS

[Means for Solving the Problem]In order to attain the above-mentioned purpose, in the invention according to claim 1. In a power transmission device of a clutch loess variable displacement compressor which was always made to carry out operation connection of an external driving source and the driving shaft via a belt and a belt pulley, While allocating an interposing member provided with an elastic deformation part which consists of a connecting part which consists of metallic materials, and thermoplastics material between said driving shaft and a belt pulley and combining the interposing member with either of a driving shaft and a belt pulley, When it is made to really weld by pressure to a usual state pivotable to another side and load torque by the side of a driving shaft is changed, When an elastic deformation part of an interposing member carries out elastic deformation and load torque by the side of a driving shaft becomes excessive, it is made for an elastic deformation part of an interposing member to fuse with frictional heat accompanying relative sliding of a pressure welding part.
[0013]In a power transmission device of the clutch loess variable displacement compressor according to claim 1 by the invention according to claim 2, A transmitting power object is attached firmly to said driving shaft, an interposing member is allocated between facing end faces of the transmitting power object and belt pulley, and a connecting part of the interposing member is made to weld by pressure to a belt pulley which consists of a transmitting power object or a metallic material which consists of metallic materials.
[0014]In a power transmission device of the clutch loess variable displacement compressor according to claim 1 by the invention according to claim 3, A transmitting power object is attached firmly to said driving shaft, an interposing member is allocated between facing end faces of the transmitting power object and belt pulley, and an elastic deformation part of the interposing member is made to weld by pressure to a belt pulley which consists of a transmitting power object or a metallic material which consists of metallic materials.
[0015]In the invention according to claim 4, in a power transmission device of the clutch loess variable displacement compressor according to claim 1, joint firm attachment is carried out and an elastic deformation part of said interposing member is both [object / driving shaft / transmitting power] used.
[0016]In the invention according to claim 5, a connecting part of said interposing member is formed with iron system metal material in a power transmission device of the clutch loess variable displacement compressor according to any one of claims 1 to 4.
[0017]In a power transmission device of the clutch loess variable displacement compressor according to any one of claims 1 to 5, thermoplastics material containing a filler constitutes an elastic deformation part of said interposing member from the invention according to claim 6.
[0018]Now, in a power transmission device of the clutch loess variable displacement compressor

according to claim 1, a belt pulley is always rotating via a belt according to an external driving source of vehicle engine etc. And rotation of a belt pulley is usually transmitted to a driving shaft via an interposing member, and compression operation of the compressor is carried out. If load torque by the side of a compressor is changed at the time of operation of this compressor, an elastic deformation part of an interposing member will carry out elastic deformation, and change of that load torque will be eased. For this reason, it is controlled that change of load torque by the side of a compressor affects the external driving source side.

[0019]When load torque by the side of a compressor becomes excessive, relative sliding arises in a pressure welding part between an interposing member, a driving shaft, or a belt pulley, and frictional heat occurs. And an elastic deformation part of an interposing member fuses with this frictional heat. Thereby, a transmitting power function of an interposing member is destroyed and transfer of overload torque from a driving shaft to a belt pulley is intercepted. For this reason, it is controlled that overload torque is transmitted to the external driving source side, and has an adverse effect.

[0020]Since an elastic deformation part of an interposing member is formed with thermoplastics material, compared with a case where a rubber material is used, a fluctuation range of elasticity by temperature of an operating environment of an elastic deformation part can make it small. For this reason, even when a compressor is used by low temperature environment of a cold district etc., it can control it becoming impossible for an elastic deformation part to ease change of load torque effectively, and being carelessly fractured by small load torque.

[0021]In a power transmission device of the clutch loess variable displacement compressor according to claim 2, a connecting part of an interposing member which consists of metallic materials is welded by pressure to a transmitting power object or a belt pulley on a driving shaft which similarly consists of metallic materials. For this reason, when load torque by the side of a compressor becomes excessive, relative sliding arises in a pressure welding part between a connecting part of an interposing member, a transmitting power object, or a belt pulley, and frictional heat occurs. And this frictional heat is transmitted to an elastic deformation part of an interposing member from a connecting part, melting of that elastic deformation part is carried out, and relative rotating of the connecting part comes to be carried out to an elastic deformation part after that. Thereby, transfer of overload torque from a driving shaft to a belt pulley is intercepted certainly.

[0022]In a power transmission device of the clutch loess variable displacement compressor according to claim 3, an elastic deformation part of an interposing member which consists of thermoplastics material is welded by pressure to a transmitting power object or a belt pulley on a driving shaft which consists of metallic materials. For this reason, when load torque by the side of a compressor becomes excessive, relative sliding arises in a pressure welding part between an elastic deformation part of an interposing member, a transmitting power object, or a belt pulley, and frictional heat occurs. Melting of near the pressure welding part of an elastic deformation part is carried out by this frictional heat, and transfer of overload torque from a driving shaft to a belt pulley is intercepted. And after overload torque by the side of a compressor settles down and generation of heat of a pressure welding part is subsided, near the pressure welding part of an elastic deformation part of an interposing member is re-solidified from a molten state, and transmitting power can be resumed.

[0023]In a power transmission device of the clutch loess variable displacement compressor according to claim 4, joint firm attachment is carried out and an elastic deformation part of an interposing member both [object / driving shaft / transmitting power] uses. For this reason, while not installing a transmitting power object separately to a driving shaft and being able to reduce part mark, a weight saving of a compressor can be attained.

[0024]In a power transmission device of the clutch loess variable displacement compressor according to claim 5, a connecting part of an interposing member is formed with a thermally conductive and rigid high iron system metal material. For this reason, in composition welded by pressure to a transmitting power object or a belt pulley on a driving shaft in which especially a connecting part of an interposing member consists of metallic materials, frictional heat accompanying relative sliding of a pressure welding part is promptly transmitted to an elastic deformation part of an interposing member from a connecting part. And melting of the elastic deformation part is carried out promptly, and transfer to an external driving source of overload torque by the side of a compressor is intercepted certainly and promptly.
[0025]An elastic deformation part of an interposing member is constituted by thermoplastics material containing a filler in a power transmission device of the clutch loess variable displacement compressor according to claim 6. For this reason, intensity of an elastic deformation part improves by a reinforcing operation of a filler, and generating of unprepared transmitting power interception by small load torque is controlled.
[0026]
[Embodiment of the Invention]
(A 1st embodiment) Below, a 1st embodiment of this invention is described based on drawing 1 - drawing 3.
[0027]First, the composition of a clutch loess variable displacement compressor is explained. As shown in drawing 1, the front housing 12 which similarly constitutes some housing is joined to the front end of the cylinder block 11 which constitutes some housing. Junction immobilization of the rear housing 13 which constitutes some housing as well as the back end of the cylinder block 11 is carried out via the valve plate 14. The crankcase 15 which serves as a control pressure chamber is formed between the front housing 12 and the cylinder block 11.
[0028]Construction support of the driving shaft 16 is carried out pivotable between said front housing 12 and the cylinder block 11. The front end of the driving shaft 16 is projected from the crankcase 15 to the exterior, and the belt pulley 17 is attached firmly to the projecting end part. Operation connection of the belt pulley 17 is always carried out at the vehicle engine (graphic display abbreviation) which makes an external driving source via the belt 18.
[0029]The belt pulley 17 is supported by the front housing 12 via the angular bearing 19. And the load of an axial direction and the load of a radial direction which act on the belt pulley 17 are responded to by the front housing 12 via the angular bearing 19.
[0030]The lip seal 20 intervenes between the front end part of the driving shaft 16, and the front housing 12. The lip seal 20 prevents the pressure leak in the crankcase 15.
[0031]while the rotating support 21 is attached firmly to the driving shaft 16 -- the cam plate 22 as a cam plate -- the axial direction of the driving shaft 16 -- a slide -- it is supported so that tilting is possible and possible. The guide pin 23 of the couple in which a tip part makes the shape of a ball is attached firmly to the cam plate 22. The suspension arm 24 protrudes on said rotating support 21, and the guide hole 25 of the couple is formed in the suspension arm 24. Said guide pin 23 is inserted in the guide hole 25 so that a slide is possible.
[0032]And by the cooperation with the suspension arm 24 and the guide pin 23 of a couple, the cam plate 22 can tilt to the axial direction of the driving shaft 16, and it is as pivotable as the driving shaft 16 in one. Tilting of the cam plate 22 is guided by the slide guide relation between the guide hole 25 and the guide pin 23, and the slide support action of the driving shaft 16. If the radius central part of the cam plate 22 moves to the cylinder block 11 side, the inclination of the cam plate 22 will decrease. The inclination restriction projection 21a for regulating the maximum inclination of the cam plate 22 is formed in the rear face of the rotating support 21.
[0033]The inclination reduction spring 26 intervenes between said rotating support 21 and the

cam plate 22. And the cam plate 22 is energized toward the cylinder block 11 side with this inclination reduction spring 26 in the direction which decreases an inclination.

[0034]The receiving hole 27 is installed through the axial direction of the driving shaft 16 by the central part of the cylinder block 11, and it is formed in it so that the inner skin may serve as a diameter of the same mostly covering an overall length. In the receiving hole 27, insertion accommodation of the slide of the cylindrical cutoff body 28 is enabled from the rear-side of the cylinder block 11. The cutoff body 28 consists of the major diameter 28a and the narrow diameter portion 28b.

[0035]Into the pipe of the cutoff body 28, the rear end part of the driving shaft 16 is inserted. In the inner skin of the major diameter 28a, insertion support of the radial bearing 30 is carried out. The slip off stop of this radial bearing 30 is carried out out of the pipe of the cutoff body 28 by the circlip 31 attached to the inner skin of the major diameter 28a. And the rear end part of the driving shaft 16 is inserted in the radial bearing 30 so that a slide is possible, and it is supported by the peripheral surface of the receiving hole 27 via the radial bearing 30 and cutoff body 28.

[0036]The circular sulcus 27a is formed in the rear end inner periphery side of the receiving hole 27, and the circlip 27b is attached firmly to the circular sulcus 27a removable. The suction passage opening spring 29 intervenes between the level difference between the major diameter 28a of the cutoff body 28, and the narrow diameter portion 28b, and the circlip 27b. The elastic coefficient of this suction passage opening spring 29 is set up become smaller than the elastic coefficient of said inclination reduction spring 26, and the resultant of the energizing force of both the springs 26 and 29 is the power to the rear direction of a compressor. And the resultant of the energizing force of these springs 26 and 29 is acting on the cam plate 22, the thrust bearing 34 mentioned later, and the cutoff body 28.

[0037]The suction passage 32 which constitutes an inlet-pressure field is formed in the central part of the rear housing 13. The suction passage 32 is on the extension wire of the driving shaft 16 used as the moving trucking of the cutoff body 28. The opening of the suction passage 32 is carried out to the rear-side of the receiving hole 27, and the locating face 33 is formed in the circumference of the opening of the suction passage 32 by the side of the receiving hole 27. The locating face 33 is on the valve plate 14. The apical surface of the narrow diameter portion 28b of the cutoff body 28 can contact the locating face 33. And when the apical surface of the narrow diameter portion 28b contacts the locating face 33, movement in the direction of a rear-side of the cutoff body 28 is regulated.

[0038]On the driving shaft 16 between the cam plate 22 and the cutoff body 28, the thrust bearing 34 is supported so that a slide of on the driving shaft 16 is possible. Rotation of the cam plate 22 has the transfer to the cutoff body 28 prevented by existence of the thrust bearing 34.

[0039]The **** type piston 35 is accommodated in two or more cylinder bores 11a installed by the cylinder block 11. Rotational movement of the cam plate 22 is changed into round trip-before and after each piston 35 rocking via the shoe 36 of a couple, and, as a result, longitudinal slide movement of the piston 35 is carried out within the cylinder bore 11a.

[0040]Into the rear housing 13, section forming of the inhalatorium 37 and the regurgitation room 38 is carried out. On the valve plate 14, corresponding to each cylinder bore 11a, the suction port 39 and the discharge port 40 are formed, and the suction valve portion 41 and the discharge valve 42 are formed so that it may correspond with these suction ports 39 and discharge ports 40.

[0041]By double-acting operation to a bottom dead point position from the upper dead point position of the piston 35, the refrigerant gas in the inhalatorium 37 pushes away the suction valve portion 41 from the suction port 39, and flows into the cylinder bore 11a. After the refrigerant gas which flowed into the cylinder bore 11a is compressed by the forward movement from the bottom dead point position of the piston 35 to an upper dead point position until it reached the

predetermined pressure, it pushes away the discharge valve 42 from the discharge port 40, and is breathed out by it at the regurgitation room 38. In contact with the retainer 43, opening regulation of the discharge valve 42 is carried out.

[0042]The thrust bearing 44 intervenes between the rotating support 21 and the front housing 12. The thrust bearing 44 catches the compressive reaction which acts on the rotating support 21 via the piston 35, the shoe 36, the cam plate 22, and the guide pin 23 from the cylinder bore 11a.

[0043]The inhalatorium 37 is open for free passage to the receiving hole 27 via the vent hole 45. And when the cutoff body 28 contacts the locating face 33, the front end of the suction passage 32 is closed and the vent hole 45 is intercepted from the suction passage 32.

[0044]The axial center passage 46 is formed in the driving shaft 16. The opening of the entrance 46a of the axial center passage 46 is carried out to the crankcase 15 in the lip-seal 20 neighborhood, and it is carrying out the opening of the exit 46b of the axial center passage 46 into the pipe of the cutoff body 28. The pressure-discharge vent hole 47 is installed by the peripheral surface of the cutoff body 28. The pressure-discharge vent hole 47 is opening the receiving hole 27 for free passage in the pipe of the cutoff body 28.

[0045]Said regurgitation room 38 and the crankcase 15 are connected in the air supply passage 48. In the middle of the air supply passage 48, the capacity control valve 49 for opening and closing the air supply passage 48 is formed. Between said suction passage 32 and the capacity control valve 49, the pressure-taking passage 50 for drawing the suction pressure Ps in the capacity control valve 49 is formed.

[0046]The suction passage 32 used as the entrance at the time of introducing a refrigerant gas to the inhalatorium 37 and the discharge flange 51 which discharges a refrigerant gas from the regurgitation room 38 are connected in the external refrigerant circuit 52. All over the external refrigerant circuit 52, the condenser 53, the expansion valve 54, and the evaporator 55 intervene. The expansion valve 54 consists of a temperature type automatic expansion valve, and controls a refrigerant flow rate according to change of the gas temperature of the outlet side of the evaporator 55. The temperature sensor 56 is installed near the evaporator 55. The temperature sensor 56 detects the temperature in the evaporator 55, and this detection temperature information is sent to the control computer 57. The room temperature setter 58, the room temperature sensor 59, the air-conditioner operating switch 60, and engine speed sensor 61 grade for specifying the temperature of the car interior of a room of vehicles are connected to the control computer 57.

[0047]The room temperature as which the control computer 57 was beforehand specified by the room temperature setter 58, for example, Based on external signals, such as the one or the OFF signal from the detection temperature acquired from the temperature sensor 56, the detection temperature acquired from the room temperature sensor 59, and the air-conditioner operating switch 60, and an engine speed value obtained from the engine speed sensor 61, the drive circuit 62 is ordered an input current value. The drive circuit 62 is outputted to the coil 84 of the solenoid mechanism 65 of the capacity control valve 49 which mentions the ordered input current value later. As other external signals, there is a signal from an outdoor temperature sensor, for example, and an input current value is determined according to the environment of vehicles.

[0048]Said capacity control valve 49 joins the valve housing 64 and the solenoid mechanism 65 in near a center, and is constituted. Between the valve housing 64 and the solenoid mechanism 65, section forming of the valve chest 66 is carried out, and the valve element 67 is accommodated in the valve chest 66. The opening of the valve port 68 is carried out to the valve chest 66 so that it may counter with the valve element 67. This valve port 68 is formed so that it may extend in the axial direction of the valve housing 64. The compulsive opening spring 69 is infixed between the valve element 67 and the internal surface of the valve chest 66, and the valve element 67 is

energized to the opening direction of the valve port 68. This valve chest 66 is opened for free passage by the regurgitation room 38 in the rear housing 13 via the valve chest port 70 and said air supply passage 48.

[0049]Section forming of the pressure-sensitive room 71 is carried out to the upper part of the valve housing 64. This pressure-sensitive room 71 is opened for free passage by the suction passage 32 of the rear housing 13 via the suction pressure introduction port 72 and said pressure-taking passage 50. The bellows 73 is accommodated in the inside of the pressure-sensitive room 71. Between the pressure-sensitive room 71 of the valve housing 64, and said valve chest 66, the pressure-sensitive rod guide 74 which follows said valve port 68 is formed. In the pressure-sensitive rod guide 74, the pressure-sensitive rod 75 is inserted in so that sliding is possible. Operation connection of said valve element 67 and said bellows 73 is carried out by this pressure-sensitive rod 75. The portion of the side joined to the valve element 67 of the pressure-sensitive rod 75 is a byway in order to secure the passage of the refrigerant gas in the valve port 68.

[0050]The port 76 is formed in the valve housing 64 so that it may intersect perpendicularly with said valve port 68 between the valve chest 66 and the pressure-sensitive room 71. The port 76 is opened for free passage by the crankcase 15 via the air supply passage 48. That is, the valve chest port 70, the valve chest 66, the valve port 68, and the port 76 constitute said a part of air supply passage 48.

[0051]The fixed iron core 78 fits into the upper opening of the chamber houses 77 of said solenoid mechanism 65, and the solenoid chamber 79 is divided by this fixed iron core 78 in the chamber houses 77. The moving core 80 which makes roofed cylindrical shape mostly is reciprocatably accommodated in the solenoid chamber 79. The flattery spring 81 is infixed between the moving core 80 and the bottom of the chamber houses 77. This flattery spring 81 is what has an elastic coefficient smaller than said compulsive opening spring 69.

[0052]The solenoid rod guide 82 which opens the solenoid chamber 79 and the valve chest 66 for free passage is formed in said fixed iron core 78. The solenoid rod 83 is said valve element 67 and really formed, and in the solenoid rod guide 82, is inserted in so that sliding is possible. The end by the side of the moving core 80 of the solenoid rod 83 is contacted by the moving core 80 according to the energizing force of said compulsive opening spring 69 and the flattery spring 81. And operation connection of said moving core 80 and the valve element 67 is carried out via the solenoid rod 83.

[0053]The cylindrical coil 84 is arranged at the outside of said fixed iron core 78 and the moving core 80 so that both the iron cores 78 and 80 may be straddled. Based on instructions of said control computer 57, predetermined current is supplied to this coil 84 from the drive circuit 62.

[0054]Next, the power transmission device attached decoratively between said driving shaft 16 and the belt pulley 17 is explained. As shown in drawing 1 and drawing 2, with the bolt 87 screwed at the tip of the driving shaft 16, via the plate spring 88 as a pressure contact means, the transmitting power object 86 is really pivotable in the projecting end part of the driving shaft 16, and is attached firmly to it movable to the axial direction. This power transmission member 86 is formed in disc-like with iron system metal material, and while the boss section 86a protrudes in that center of an inner surface, the annular bond part 86b protrudes on the inner surface periphery.

[0055]Fit-in support of the interposing member 89 is carried out at the boss section 86a of the transmitting power object 86 so that it may be allocated between the facing end faces of said transmitting power object 86 and the belt pulley 17. This interposing member 89 comprises the disc-like elastic deformation board 90, two or more connecting pins 91 as a connecting part which protruded on the end face by the side of the belt pulley 17 of that elastic deformation board 90,

and the circular friction material 92 laid under the end face by the side of the transmitting power object 86 of the elastic deformation board 90 as an elastic deformation part. The elastic deformation board 90, for example Glass fiber, an aramid fiber, an alumina fiber, Silicon carbide fiber, a silicon carbide whisker, a potassium titanate whisker, Fillers, such as talc, mica, and clay, contained, for example, are formed with thermoplastics materials, such as polypropylene, polyamide, polyester, polyacetal, PORI carbonate, an acrylic resin, an AS resin, ABS plastics, and alloy resin of these resin. The connection pin 91 is formed with iron system metal material, and burial immobilization is carried out in the narrow diameter portion 91a of the end face at the elastic deformation board 90.

[0056]And the transmitting power object 86 and the interposing member 89 are forced by the energizing force of said plate spring 88 toward the belt pulley 17 side. Thereby, press junction of the bond part 86b of the transmitting power object 86 is carried out at the friction material 92 of the interposing member 89, and frictional coupling of the transmitting power object 86 and the interposing member 89 is always carried out. With this, each connecting pin 91 of the interposing member 89 is welded by pressure to the end face of the belt pulley 17 which consists of iron system metal material, and the interposing member 89 rotates [belt pulley / 17] in one in a usual state.

[0057]In the state where rotation is transmitted to the driving shaft 16 via the interposing member 89 and the transmitting power object 86 from the belt pulley 17, when the load torque by the side of the driving shaft 16 is changed, the elastic deformation board 90 of the interposing member 89 carries out elastic deformation, and change of the load torque is eased.

[0058]When the load torque by the side of the driving shaft 16 becomes excessive, relative sliding arises in the pressure welding part between the connecting pin 91 of the interposing member 89, and the belt pulley 17, and frictional heat occurs. This frictional heat is transmitted to the narrow diameter portion 91a side of the connecting pin 91, and melting of the elastic deformation board 90 of the interposing member 89 is carried out in the portion in contact with the narrow diameter portion 91a of the connecting pin 91. And by the molten state of this elastic deformation board 90, as a broken chain line shows to drawing 2, the idling slot 93 is formed in the side of the elastic deformation board 90 of the narrow diameter portion 91a of the connecting pin 91, and relative rotating of the connecting pin 91 is carried out after that to the elastic deformation board 90.

[0059]Next, operation of the clutch loess variable displacement compressor constituted as mentioned above is explained. Now, when the detection temperature from which the air-conditioner operating switch 60 is obtained from the room temperature sensor 59 under an ON state is more than the preset temperature of the room temperature setter 58, the control computer 57 orders it magnetization of the solenoid mechanism 65. Then, predetermined current is supplied to the coil 84 via the drive circuit 62, and as shown in drawing 1, among both the iron cores 78 and 80, the suction force according to an input current value arises. This suction force resists the energizing force of the compulsive opening spring 69, is made into the power of a direction in which a valve opening decreases, and is transmitted to the valve element 67 via the solenoid rod 83.

[0060]On the other hand, in the excited state of this solenoid mechanism 65, the bellows 73 is displaced according to change of the suction pressure Ps introduced into the pressure-sensitive room 71 via the pressure-taking passage 50 from the suction passage 32. And the displacement according to the suction pressure Ps of this bellows 73 is told to the valve element 67 via the pressure-sensitive rod 75. Therefore, as for the capacity control valve 49, a valve opening is determined by the balance of the energizing force from the solenoid mechanism 65, the energizing force from the bellows 73, and the energizing force of the compulsive opening spring 69.

[0061]When cooling load is large, the difference of the temperature detected, for example by the

room temperature sensor 59 and the preset temperature of the room temperature setter 58 becomes large. The control computer 57 controls an input current value to change a setting-out inlet pressure based on detection temperature and a setting-out room temperature. That is, to the drive circuit 62, it is ordered the control computer 57 so that detection temperature is high, and an input current value may be enlarged. Therefore, the suction force between the fixed iron core 78 and the moving core 80 becomes strong, and the energizing force to the direction which makes the valve opening of the valve element 67 small increases. And opening and closing of the valve element 67 are performed by the lower suction pressure Ps. Therefore, when a current value increases, the capacity control valve 49 operates so that the lower suction pressure Ps may be held.

[0062]If the valve opening of the valve element 67 becomes small, the amount of refrigerant gases which flows into the crankcase 15 via the air supply passage 48 from the regurgitation room 38 will decrease. On the other hand, the refrigerant gas in the crankcase 15 is flowing into the inhalatorium 37 via the axial center passage 46 and the pressure-discharge vent hole 47. For this reason, the pressure Pc in the crankcase 15 declines. In the state where cooling load is large, the pressure in the cylinder bore 11a is also high, and the difference of the pressure Pc in the crankcase 15 and the pressure in the cylinder bore 11a becomes small. For this reason, the inclination of the cam plate 22 becomes large.

[0063]If the passing cross section in the air supply passage 48 becomes zero, i.e., the state where the valve element 67 of the capacity control valve 49 stopped the valve port 68 thoroughly, supply of high pressure refrigerant gas to the crankcase 15 from the regurgitation room 38 will no longer be performed. And the pressure Pc in the crankcase 15 becomes almost the same as that of the pressure Ps in the inhalatorium 37, and the inclination of the cam plate 22 serves as the maximum. The maximum inclination of the cam plate 22 is regulated by the contact to the inclination restriction projection 21a of the rotating support 21, and the cam plate 22, and discharging volume serves as the maximum.

[0064]On the contrary, when cooling load is small, the difference of the temperature detected, for example by the room temperature sensor 59 and the preset temperature of the room temperature setter 58 becomes small. To the drive circuit 62, it is ordered the control computer 57 so that detection temperature is low, and an input current value may be made small. For this reason, the suction force between the fixed iron core 78 and the moving core 80 becomes weak, and the energizing force to the direction which makes the valve opening of the valve element 67 small decreases. And opening and closing of the valve element 67 are performed by the higher suction pressure Ps. Therefore, when a current value decreases, the capacity control valve 49 operates so that the higher suction pressure Ps may be held.

[0065]If the valve opening of the valve element 67 becomes large, the amount of refrigerant gases which flows into the crankcase 15 from the regurgitation room 38 will increase, and the pressure Pc in the crankcase 15 will rise. In the state where this cooling load is small, the pressure in the cylinder bore 11a is low, and the difference of the pressure Pc in the crankcase 15 and the pressure in the cylinder bore 11a becomes large. For this reason, the inclination of the cam plate 22 becomes small.

[0066]If the state where there is no cooling load is approached, it will fall so that the temperature in the evaporator 55 may approach the temperature which brings about frothed generating. If the detection temperature from the temperature sensor 56 turns into below preset temperature, the control computer 57 will order it demagnetization of the solenoid mechanism 65 to the drive circuit 62. Said preset temperature reflects the situation where Frost is likely to be generated in the evaporator 55. And supply of the current to the coil 84 is suspended, the solenoid mechanism 65 is demagnetized, and the suction force of the fixed iron core 78 and the moving core 80

disappears.

[0067]For this reason, as shown in drawing 3, the valve element 67 resists the energizing force of the flattery spring 81 which acts via the moving core 80 and the solenoid rod 83 according to the energizing force of the compulsive opening spring 69, and is moved caudad. And the valve element 67 shifts to the valve opening position which opened the valve port 68 to the maximum. Therefore, the high pressure refrigerant gas in the regurgitation room 38 is supplied to the crankcase 15 so much via the air supply passage 48, and the pressure Pc in the crankcase 15 becomes high. By the pressure buildup in this crankcase 15, the inclination of the cam plate 22 shifts to minimum inclination.

[0068]Based on the OFF signal of the air-conditioner operating switch 60, the control computer 57 orders it demagnetization of the solenoid mechanism 65, and the inclination of the cam plate 22 shifts to minimum inclination also by this demagnetization.

[0069]Thus, the switching action of the capacity control valve 49 changes according to the size of an input current value to the coil 84. If an input current value becomes large, opening and closing will be performed by the low suction pressure Ps, and if an input current value becomes small, a switching action will be performed by the high suction pressure Ps. A compressor changes the inclination of the cam plate 22 and changes the discharging volume so that the set-up suction pressure Ps may be maintained. That is, the capacity control valve 49 is bearing the role which changes an input current value and changes the preset value of the suction pressure Ps, and the role which performs minimum capacity operation regardless of the suction pressure Ps. By providing such a capacity control valve 49, the compressor is bearing the role which changes the refrigerating capacity of a refrigeration circuit.

[0070]Tilting of the cam plate 22 is transmitted to the cutoff body 28 via the thrust bearing 34 with movement by the side of the cutoff body 28 of said cam plate 22. The cutoff body 28 resists the energizing force of the suction passage opening spring 29 by this tilting transfer, and it is moved to the locating face 33 side. Here, the cutoff body 28 decreases the passing cross section of the suction passage 32 gradually. Wire drawing by this slow passing cross section change decreases gradually the refrigerant-gas inflow from the suction passage 32 to the inhalatorium 37. For this reason, the amount of refrigerant gases inhaled into the cylinder bore 11a from the inhalatorium 37 also decreases gradually, and discharging volume decreases gradually. Therefore, discharge-pressure Pd decreases gradually and the load torque in a compressor is not changed sharply for a short time. As a result, change of the load torque in the clutch loess variable displacement compressor [it results in the minimum discharging volume from the maximum discharging volume] of a between becomes slow, and the shock by change of load torque is eased.

[0071]If the inclination of the cam plate 22 becomes the minimum as shown in drawing 3, the cutoff body 28 will contact the locating face 33, and the suction passage 32 will be intercepted. In this state, the passing cross section in the suction passage 32 serves as zero, and the refrigerant-gas inflow to the inhalatorium 37 is prevented from the external refrigerant circuit 52. The minimum inclination of this cam plate 22 is set up become a slightly bigger predetermined value than 0 degree. This minimum inclination state is brought about when the cutoff body 28 has been arranged in the closed position which intercepts a free passage with the suction passage 32 and the receiving hole 27. The cutoff body 28 is interlocked with rocking of the cam plate 22, and is switched and arranged to said closed position and the open position estranged from this position.

[0072]Since the minimum inclination of the cam plate 22 is not 0 degree, also in the minimum inclination state, the regurgitation of the refrigerant gas from the cylinder bore 11a to the regurgitation room 38 is performed. The refrigerant gas breathed out at the regurgitation room 38

flows into the crankcase 15 through the air supply passage 48 from the cylinder bore 11a. The refrigerant gas in the crankcase 15 flows into the inhalatorium 37 through the axial center passage 46, the pressure-discharge vent hole 47, and the vent hole 45. The refrigerant gas in the inhalatorium 37 is inhaled into the cylinder bore 11a, and is breathed out again at the regurgitation room 38.

[0073]That is, in the state of minimum inclination, the regurgitation room 38, the air supply passage 48, the crankcase 15, the axial center passage 46, the pressure-discharge vent hole 47, the receiving hole 27, the vent hole 45, the inhalatorium 37, and the circulating passage that goes via the cylinder bore 11a are formed in the compressor. And the pressure differential has arisen between the regurgitation room 38, the crankcase 15, and the inhalatorium 37. Therefore, a refrigerant gas circulates through said circulating passage, and the lubricating oil which flows with a refrigerant gas carries out the lubrication of each sliding part in a compressor.

[0074]If the temperature of the car interior of a room rises and cooling load increases in the state where the air-conditioner operating switch 60 is in an ON state, and the cam plate 22 is in a minimum inclination position, the temperature detected by the room temperature sensor 59 will exceed the preset temperature of the room temperature setter 58. The control computer 57 orders it magnetization of the solenoid mechanism 65 based on this detection temperature change. The air supply passage 48 is closed by magnetization of the solenoid mechanism 65, and the pressure Pc of the crankcase 15 decompresses based on pressure discharge through the axial center passage 46 and the pressure-discharge vent hole 47. With this decompression, the suction passage opening spring 29 develops from the reduction state of drawing 3. And the cutoff body 28 estranges from the locating face 33, and the inclination of the cam plate 22 increases from the minimum inclination state of drawing 3.

[0075]With alienation of this cutoff body 28, the passing cross section in the suction passage 32 increases slowly, and refrigerant-gas inflow's from the suction passage 32 to the inhalatorium 37 increases gradually. Therefore, the amount of refrigerant gases inhaled into the cylinder bore 11a from the inhalatorium 37 also increases gradually, and discharging volume increases gradually. Therefore, discharge-pressure Pd increases gradually and the load torque in a compressor is not changed sharply for a short time. As a result, change of the load torque in the clutch loess variable displacement compressor [it results in the maximum discharging volume from the minimum discharging volume] of a between becomes slow, and the shock by change of load torque is eased.

[0076]If the vehicle engine which makes an external driving source stops, operation of a compressor will also suspend a stop, i.e., rotation of the cam plate 22, and the energization to the coil 84 of the capacity control valve 49 will also be stopped. For this reason, the solenoid mechanism 65 is demagnetized, the air supply passage 48 is opened wide, and the inclination of the cam plate 22 serves as the minimum.

[0077]Next, operation of the power transmission device attached decoratively between said driving shaft 16 and the belt pulley 17 is explained. Now, in this power transmission device, while frictional coupling of the bond part 86b of the transmitting power object 86 is carried out to the friction material 92 of the interposing member 89 by the energizing force of the plate spring 88, each connecting pin 91 of the interposing member 89 is welded by pressure to the end face of the belt pulley 17. For this reason, when the belt pulley 17 always rotates via the belt 18 with the vehicle engine as an external driving source, that rotation is transmitted to the driving shaft 16 via the interposing member 89 and the transmitting power object 89, and compression operation of the compressor is carried out.

[0078]If the load torque by the side of a compressor is changed at the time of operation of this compressor, the elastic deformation board 90 of the interposing member 89 will carry out elastic

deformation, and change of that load torque will be eased. For this reason, change of the load torque by the side of a compressor does not affect the vehicle engine side as an external driving source, and it can control changing the number of rotations of that vehicle engine.

[0079]If the load torque by the side of a compressor becomes excessive, relative sliding will arise in the pressure welding part between the connecting pin 91 of the interposing member 89, and the belt pulley 17, and frictional heat will occur. And this frictional heat is transmitted to the elastic deformation board 90 through each connecting pin 91, and melting of that elastic deformation board 90 is carried out near narrow diameter portion 91a of the connecting pin 91. As a broken chain line shows to drawing 2 by the molten state of this elastic deformation board 90, the idling slot 93 is formed in the side of the elastic deformation board 90 of the narrow diameter portion 91a of the connecting pin 91, and relative rotating of the connecting pin 91 is carried out after that to the elastic deformation board 90 in this idling slot 93. It can control transfer of the overload torque from the driving shaft 16 to the belt pulley 17 being intercepted, and having an adverse effect on vehicle engine by this.

[0080]An effect expectable by the aforementioned embodiment is indicated below.

(a) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, when the load torque by the side of the driving shaft 16 is changed, the elastic deformation board 90 of the interposing member 89 which consists of thermoplastics material carries out elastic deformation. When the load torque by the side of the driving shaft 16 becomes excessive, relative sliding arises in the pressure welding part between the interposing member 89 and the belt pulley 17, frictional heat occurs in it, and melting of the elastic deformation board 90 of the interposing member 89 is carried out to it by the frictional heat. For this reason, although structure is easy, while being able to ease effectively change of the load torque by the side of a compressor, transfer of the overload torque to the vehicle engine which makes an external driving source can be intercepted certainly.

[0081](b) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, the elastic deformation board 90 of the interposing member 89 is formed with thermoplastics material. For this reason, even when a compressor is used by the low temperature environment of a cold district etc., change of the elasticity of the elastic deformation board 90 can be suppressed small. Therefore, it can control that it becomes impossible to ease change of load torque effectively, and it fractures carelessly under low temperature environment even if the elastic deformation board 90 is not big load torque.

[0082](c) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, when the load torque by the side of a compressor becomes excessive, relative sliding arises in the pressure welding part between the connecting pin 91 of the interposing member 89, and the belt pulley 17, and frictional heat occurs. For this reason, frictional heat is transmitted to the elastic deformation board 90 from the connecting pin 91, melting of that elastic deformation board 90 is carried out near narrow diameter portion 91a of the connecting pin 91, and relative rotating of the connecting pin 91 comes to be carried out to the elastic deformation board 90 after that. Therefore, transfer of the overload torque from the driving shaft 16 to the belt pulley 17 can be intercepted certainly.

[0083](d) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, the connecting pin 91 of the interposing member 89 is formed with a thermally conductive and rigid high iron system metal material. For this reason, in the composition of said embodiment welded by pressure to the belt pulley 17 which consists of metallic materials, the frictional heat accompanying the relative sliding of a pressure welding part is promptly transmitted to the elastic deformation board 90 from the connecting pin 91, and especially the connecting pin 91 of the interposing member 89 can fuse that elastic deformation board 90

promptly. Therefore, transfer of the overload torque from the driving shaft 16 to the belt pulley 17 can be intercepted promptly and certainly.

[0084](e) In the power transmission device of the clutch loess variable displacement compressor of this embodiment, the elastic deformation board 90 of the interposing member 89 is constituted by the thermoplastics material containing a filler. For this reason, the intensity of the elastic deformation board 90 improves by the reinforcing operation of a filler, and generating of the unprepared transmitting power interception by small load torque is controlled.

[0085](A 2nd embodiment), next a 2nd embodiment of this invention are described focusing on a different portion from said 1st embodiment.

[0086]In the power transmission device of this 2nd embodiment, as shown in drawing 4, while the connecting pin 91 of the interposing member 89 protrudes on the end face by the side of the transmitting power object 86 of the elastic deformation board 90, the friction material 92 is laid under the end face by the side of the belt pulley 17 of the elastic deformation board 90. Formed protruding of the circular bond part 96 is carried out to the end face of the belt pulley 17. And while frictional coupling of the friction material 92 of the interposing member 89 is carried out to the bond part 96 of the belt pulley 17 by the energizing force of the plate spring 88, the connecting pin 91 of the interposing member 89 is welded by pressure to the bond part 86b of the transmitting power object 86 by it.

[0087]Therefore, also in this 2nd embodiment, almost like a 1st embodiment mentioned above, if the load torque by the side of a compressor is changed at the time of operation of a compressor, the elastic deformation board 90 of the interposing member 89 will carry out elastic deformation, and change of that load torque will be eased. For this reason, it can control change of the load torque by the side of a compressor affecting the vehicle engine side as an external driving source, and changing the number of rotations of that vehicle engine.

[0088]If the load torque by the side of a compressor becomes excessive, relative sliding will arise in the pressure welding part between the connecting pin 91 of the interposing member 89, and the transmitting power object 86, and frictional heat will occur. And this frictional heat is transmitted to the elastic deformation board 90 through each connecting pin 91, and melting of that elastic deformation board 90 is carried out near narrow diameter portion 91a of the connecting pin 91. By the molten state of this elastic deformation board 90, the idling slot 93 is formed in the side of the elastic deformation board 90 of the narrow diameter portion 91a of the connecting pin 91, and relative rotating of the connecting pin 91 is carried out after that to the elastic deformation board 90. It can control transfer of the overload torque from the driving shaft 16 to the belt pulley 17 being intercepted, and having an adverse effect on vehicle engine by this.

[0089](A 3rd embodiment), next a 3rd embodiment of this invention are described focusing on a different portion from said 1st embodiment.

[0090]Now, as the power-transmission-device smell of this 3rd embodiment is shown in drawing 5, two or more fitting recesses 97 are formed in the end face of the belt pulley 17, the connecting pin 91 of the interposing member 89 fits into these fitting recesses 97, and the interposing member 89 and the belt pulley 17 are really combined pivotable. The split-face-like pressure welding face 98 is formed in the elastic deformation board 90 of the bond part 86b of the transmitting power object 86, and the field which counters. And this pressure welding face 98 is welded by pressure to the elastic deformation board 90 by the energizing force of the plate spring 88.

[0091]Therefore, also in this 3rd embodiment, almost like a 1st embodiment mentioned above, when the load torque by the side of a compressor is changed, the elastic deformation board 90 of the interposing member 89 carries out elastic deformation, change of that load torque is eased, and influencing of the torque variation by the side of vehicle engine is controlled.

[0092]When the load torque by the side of a compressor becomes excessive, relative sliding arises in the pressure welding part between the elastic deformation board 90 of the interposing member 89, and the pressure welding face 98 of the transmitting power object 86, and frictional heat occurs. And by this frictional heat, melting of the pressure welding face 98 of the elastic deformation board 90 and the portion which counters is carried out, and transfer of the overload torque from the driving shaft 16 to the belt pulley 17 is intercepted. Therefore, it can control that the overload torque by the side of a compressor has an adverse effect on vehicle engine.
[0093]After the overload torque by the side of a compressor settles down and generation of heat of said pressure welding part is subsided, the pressure welding face 98 of the elastic deformation board 90 of the interposing member 89 and the portion which counters are re-solidified from a molten state. For this reason, it is not necessary to carry out desorption exchange of the interposing member 89 with a new thing, and the transmitting power from the belt pulley 17 to the driving shaft 16 can be resumed.
[0094](A 4th embodiment), next a 4th embodiment of this invention are described focusing on a different portion from said 1st embodiment.
[0095]Now, as the power-transmission-device smell of this 4th embodiment is shown in drawing 6, to the projecting end part of the driving shaft 16, the elastic deformation board 90 of the interposing member 89 is really pivotable, and joint firm attachment is carried out movable to the axial direction. And this elastic deformation board 90 makes a transmitting power object serve a double purpose. As for this interposing member 89, the connecting pin 91 of the eclipse with direct aggressiveness and the interposing member 89 is welded by pressure to the end face of the belt pulley 17 toward the belt pulley 17 side with the plate spring 88.
[0096]Therefore, also in this 4th embodiment, almost like a 1st embodiment mentioned above, when the load torque by the side of a compressor is changed, the elastic deformation board 90 of the interposing member 89 carries out elastic deformation, and change of that load torque is eased. When load torque becomes excessive, relative sliding arises in the pressure welding part between the connecting pin 91 and the belt pulley 17, frictional heat occurs, melting of the elastic deformation board 90 is carried out by the frictional heat, and transfer of overload torque is intercepted. Therefore, the almost same effect as said 1st embodiment can be demonstrated.
[0097]In this 4th embodiment, joint firm attachment is carried out and the elastic deformation board 90 of the interposing member 89 both [object / driving shaft / 16 / transmitting power] uses. For this reason, while not installing a transmitting power object separately to the driving shaft 16 and being able to reduce part mark, the weight saving of a compressor can be attained.
[0098]This invention can change as follows and can also take shape.
(1) In the power transmission device of each of said embodiment, form the connecting part of the interposing member 89 in a circle with iron system metal material, and constitute to lay under the elastic deformation board 90 two or more pins which protruded on the rear face.
[0099](2) Provide an energizing member which is different in the plate spring 88 as a pressure contact means in the power transmission device of each of said embodiment.
(3) While forming the fitting recess 97 on the transmitting power object 86 and making the connecting pin 91 of the interposing member 89 fit into the fitting recess 97 in said 3rd embodiment, Form the split-face-like pressure welding face 98 on the elastic deformation board 90 of the interposing member 89 of the belt pulley 17, and the field which counters, and constitute to make the pressure welding face 98 of the belt pulley 17 weld by pressure to the elastic deformation board 90.
[0100]Even if constituted like these, the almost same operation as said each embodiment and an effect can be acquired.

[Translation done.]

DESCRIPTION OF DRAWINGS

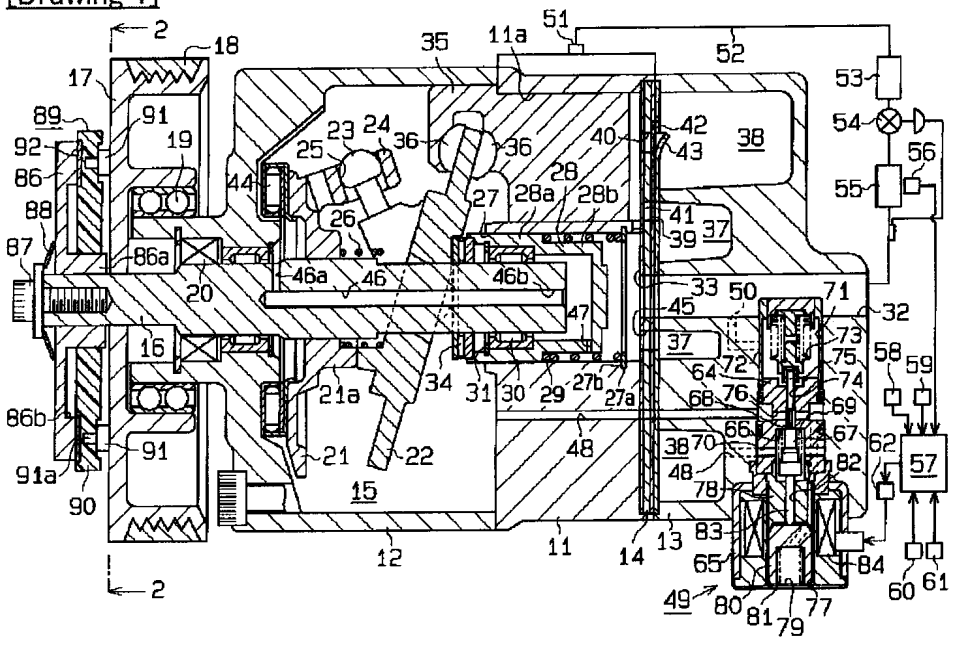
[Brief Description of the Drawings]
[Drawing 1]The sectional view showing the maximum inclination state of the clutch loess variable displacement compressor provided with the power transmission device of a 1st embodiment.
[Drawing 2]The sectional view in two to 2 line of drawing 1.
[Drawing 3]The sectional view showing the minimum inclination state of the compressor of drawing 1.
[Drawing 4]The fragmentary sectional view showing the power transmission device of a 2nd embodiment.
[Drawing 5]The fragmentary sectional view showing the power transmission device of a 3rd embodiment.
[Drawing 6]The fragmentary sectional view showing the power transmission device of a 4th embodiment.
[Description of Notations]
16 [-- A transmitting power object, 89 / -- An interposing member, 90 / -- The elastic deformation board as an elastic deformation part 91 / -- Connecting pin as a connecting part.] -- A driving shaft, 17 -- A belt pulley, 18 -- A belt, 86

[Translation done.]

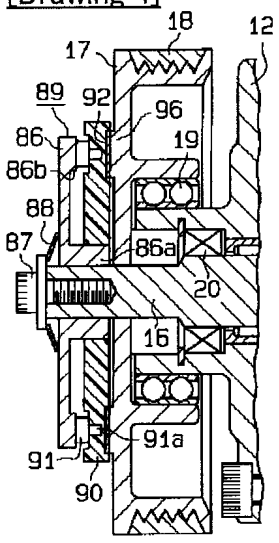
* NOTICES *

DRAWINGS

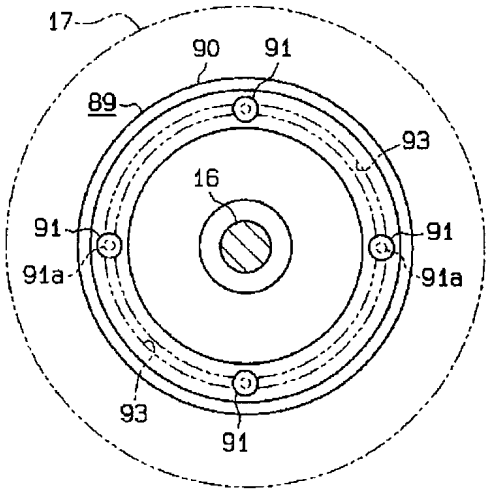
[Drawing 1]



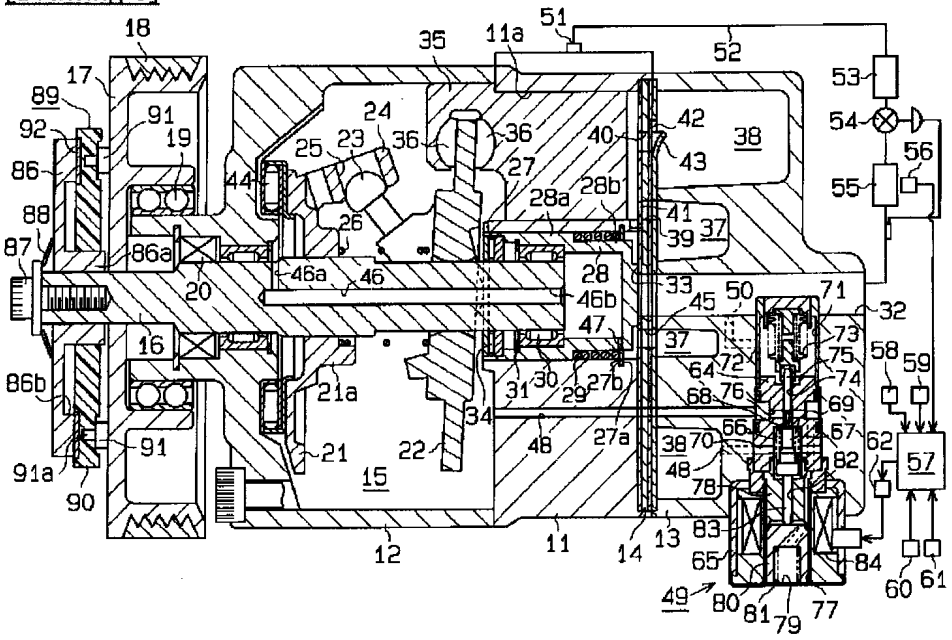
[Drawing 4]



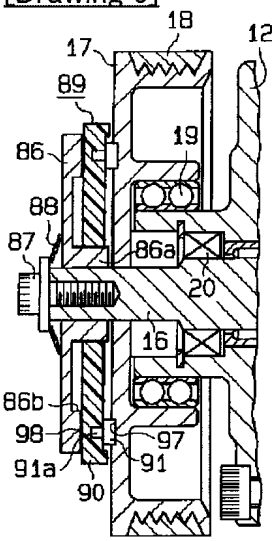
[Drawing 2]



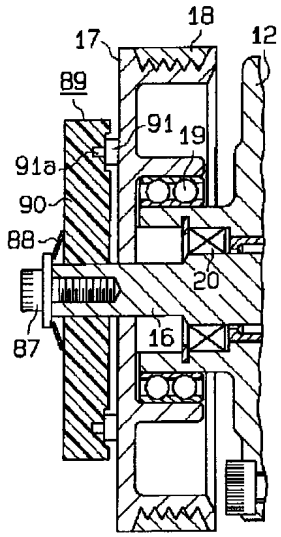
[Drawing 3]



[Drawing 5]



[Drawing 6]



[Translation done.]